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ABSTRACT

The Flight Standards Service of the Federal Aviation Administration developed the guide to assist applicants who are preparing for the Flight Instructor Certificate with Airplane Rating. The guide contains comprehensive study outlines and a list of recommended study materials and tells how to obtain those publications. It also includes sample test items with explanations of the correct answers and provides illustrations representative of those found on FAA written tests. The guide should be used by those seeking certification under the revised provisions of Federal Aviation Regulation, Part 61, which became effective November 1, 1973. (Author)

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AC 61-72

FLIGHT INSTRUCTOR AIRPLANE *Written Test Guide*

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FLIGHT INSTRUCTOR
AIRPLANE
WRITTEN TEST GUIDE

1974

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service

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PREFACE

The Flight Standards Service of the Federal Aviation Administration has developed this guide to assist applicants who are preparing for the Flight Instructor Certificate with Airplane Rating.

This guide contains comprehensive study outlines and a list of recommended study materials and tells how to obtain those publications. It also includes sample test items with explanations of the correct answers and provides illustrations representative of those found on FAA written tests.

This guide is issued as Advisory Circular 61–72 and should be used by those persons seeking certification under the revised provisions of Federal Aviation Regulation, Part 61, which became effective November 1, 1973.

Comments regarding this publication may be directed to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

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FLIGHT INSTRUCTOR
AIRPLANE
Written Test Guide

INTRODUCTION TO FLIGHT INSTRUCTION

What is required to become a skilled and effective flight instructor? Although some people possess those traits desirable in an instructor in a greater degree than others, no one is born a natural instructor. Good flight instructors become so through study, experience, and hard work. Probably more than any other single factor, the flight instructor's own attitude toward flight instruction determines what kind of job he will do.

After the prospective flight instructor has acquired his rating, it is imperative that he make a continuous effort to stay abreast of the latest trends in aviation, regulations, and practices. This is extremely important for the flight instructor because aviation is not static, it is dynamic and changing, and what holds true today may not necessarily apply tomorrow. The flight instructor must keep himself informed about new techniques, new equipment, new procedures, and regulatory changes.

Knowledge and understanding are seldom gained quickly or easily. This is particularly true in the diversified field of flight instruction. There can be no substitute for diligent study to attain basic knowledge, unremitting effort to develop competence, and continuous review to remain current in the many areas where technological change is the rule rather than the exception.

The purpose of this publication is to provide guidance to the applicant by outlining the scope of knowledge required. By using this guide, the applicant is better able to intelligently direct his study plan.

CERTIFICATION REQUIREMENTS

To be eligible for a Flight Instructor Certificate with an Airplane rating, the certification process requires that the applicant pass a Flight Instructor-Airplane Written Test and a Fundamentals of Instructing Written Test. However, if the applicant already holds a valid FAA Flight or Ground Instructor Certificate, he is not required to take the separate test on Fundamentals of Instructing when applying for an additional instructor certificate or rating.

It is not necessary to take the Fundamentals of Instructing test on the same day as the Flight Instructor-Airplane Written Test and it is immaterial which test is taken first. The certification process also requires the applicant to pass a practical test in which he must demonstrate his competency to instruct students during flight.

THE WRITTEN TESTS

The Fundamentals of Instructing and Flight Instructor-Airplane written tests are comprehensive because they must test an applicant's knowledge in many subject areas. These areas include all the subjects required for both a private and commercial pilot certificate, as well as the Fundamentals of Instructing subject areas, such as, The Learning Process, Elements of Effective Teaching, Student Evaluation, Quizzing and Testing, Course Development, Lesson Planning, and Classroom Instruction Techniques.

The Fundamentals of Instructing written test contains 50 test items. Three hours is allowed for taking this test. The Flight Instructor-Airplane written test contains 100 test items, and the time allowed for taking this test is 5 hours. All test items are of the objective multiple-choice type, and each item can be answered by the selection of a single response as the correct choice. Each test item is independent of other test items, that is, the correct response of one test item does not depend upon, or influence, the correct response of another test item.

The applicant's answer sheet is forwarded to the FAA Aeronautical Center for processing by ADP computers. Shortly thereafter, the applicant will receive an Airman Written Test Report which not only includes his score but lists, in code, those subject areas that he answered incorrectly. These codes refer to a

list of subject matter which accompanies the report. The applicant can thus determine those subject areas in which he should strengthen his knowledge. The flight examiner may quiz the applicant on those deficient subject areas during the practical test.

TAKING THE TESTS

Communication between individuals is a complicated process. Written tests involve communication through the use of the written word between the test writer and the person being tested. Considerable effort is expended to write each test item in a clear, concise manner. Applicants should carefully read the information and instructions as well as each test item.

Read the entire test item and be sure that the objective is understood before selecting an answer. After working the problem or analyzing the statements, look through the list of alternative answers and select the one which you believe to be most nearly correct.

There are no "trick" questions injected into the test with the intention of confusing the applicants. Only one answer is completely correct. The others are derived from incorrect computations, lack of knowledge, or common misconceptions of the subject. Examine each item and alternative answer carefully. Do not search for hidden meanings or read into the item something that is not there. The question and answers mean exactly what is stated and refer to the general rule rather than the exception to the rule.

To use the allowable time most efficiently, the applicant who experiences difficulty in answering a particular item should continue on and answer those items which are less difficult. Then reconsider those which were passed over.

RECOMMENDED STUDY MATERIALS

Professionalism in flight instruction is very important. One thing that enhances professionalism is the possession of a technical library. By obtaining study materials that are beneficial and appropriate to his preparation for certification, the prospective flight instructor will be laying the foundation upon which to build his aeronautical library for use throughout his career.

The following list of source material outlines essential publications produced by the FAA but does not include all the useful and available material that is produced commercially. Other excellent textbooks, audio-visual training aids, and instructional materials may be obtained from various commercial bookstores and fixed-base operators engaged in flight training.

AVIATION WEATHER. AC 00–6. Reprinted 1969. ($4.00 GPO.) FAA 5.8/2: W 37. Contains information on weather phenomena for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying.

PLANE SENSE. AC 20–5B (Free). This booklet helps acquaint the prospective airplane owner with some fundamentals of owning and operating an airplane. It is free upon request from the U.S. Department of Transportation, Publications Section, TAD–443.1, Washington, D.C. 20590.

PRIVATE PILOT (AIRPLANE) FLIGHT TRAINING GUIDE. AC 61–2A. Reprinted 1972. ($1.95 GPO.) FAA 5.8/2:P 64/4/964. Assists flight instructors in planning the flight training of primary students. It is designed for the use of instructors who do not follow a curriculum offered by a certificated flying school.

FLIGHT TRAINING HANDBOOK. AC 61–21. Reprinted 1969. ($2.10 GPO.) FAA 1.8:F 64/4. Provides information and direction in the introduction and performance of training maneuvers for student pilots, pilots who are requalifying or preparing for additional ratings, and for flight instructors. [This publication is being redeveloped and expanded and the revision will be available at the earliest possible date.]

PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE. AC 61–23A. ($5.30 GPO.) TD 4.408:P 64/5. Contains essential, authoritative information used in training and guiding private pilots, and covers all subject areas in which an applicant may be tested. Tells how to use the Airman's Information Manual, the data in FAA-approved airplane flight manuals, and the basic instruments for airplane attitude control.

PRIVATE PILOT WRITTEN TEST GUIDE. AC 61–32A. ($2.50 GPO.) TD 4.408:P 64/971. Provides information, guidelines, and sample test items to assist applicants for the Private Pilot Certificate in attaining necessary aeronautical knowledge.

COMMERCIAL PILOT WRITTEN TEST GUIDE. AC 61–28A. ($2.00 GPO.) TD 4.408:P 64/4. Reflects current operating procedures and techniques for use of applicants in preparing for the Commercial Pilot Airplane Written Test. [This publication is being redeveloped and will be available at the earliest possible date.]

PILOT'S WEIGHT AND BALANCE HANDBOOK. AC 91–23. ($1.25 GPO.) TD 4.408:P 64/3. This

handbook provides an easily understood text on aircraft weight and balance. It progresses from an explanation of basic fundamentals to the complete application of weight and balance principles in large aircraft operations.

WAKE TURBULENCE. AC 90–23D. (Free). Presents information on the subject of wake turbulence and suggests techniques that may help pilots avoid the hazards associated with wingtip vortex turbulence. It is free upon request from the U.S. Department of Transportation, Publications Section, TAD–443.1, Washington, D.C. 20590.

TERRAIN FLYING. AC 91–15. ($1.40 GPO.) TD 4.2:T27. This pocket-size booklet is designed by the FAA for private pilots. It contains observations, opinions, warnings, and advice from veteran pilots regarding flight over various types of terrain throughout the U.S.

FLIGHT INSTRUCTOR'S HANDBOOK. AC 61–16A. This handbook is designed to give guidance and information to pilots preparing to apply for flight instructor certificates, and for use as a reference by flight instructors. ($2.00 GPO.) Reprinted in 1972. TD 4.408:In 7/3.

DENALT PERFORMANCE COMPUTER (Fixed Pitch Propeller). Safety Education Series #8. ($0.50 GPO.) FAA 5.8/2:C 73/2. A density altitude computer for use in aircraft with fixed pitch propellers. It is intended to supplement and *not* replace manufacturer's published performance information.

DENALT PERFORMANCE COMPUTER (Variable Pitch Propeller). Safety Education Series #8. ($0.50). FAA 5.8/2:C 73/2. A density altitude computer for use in aircraft with variable pitch propellers. It is intended to supplement and *not* replace manufacturer's published performance information.

NATIONAL TRANSPORTATION SAFETY BOARD PART 430. (Free.) This publication deals with procedures required in the notification and reporting of accidents and lost or overdue aircraft within the United States, its territories, and possessions. It is free upon request from the National Transportation Safety Board, Publications Branch, Washington, D.C. 20591.

AIRMAN'S INFORMATION MANUAL (AIM). Presents, in four parts, information necessary for planning and conducting flights within the National Airspace System. Besides providing frequently updated airport and NAVAID data, AIM includes instructional and procedural information and is designed for use in the cockpit. To better serve the needs of the individual pilot, each Part is available on a separate annual subscription basis:

Part 1—Basic Flight Manual and ATC Procedures. ($7.00 domestic; foreign mailing $1.75 additional. GPO): Issued quarterly. TD 4.12: pt. 1/.

Part 2—Airport Directory. ($7.00 domestic; foreign mailing $1.75 additional, GPO): Issued semi-annually. TD 4.12:pt. 2/.

Part 3 and 3A—Operational Data and Notices to Airmen. ($22.00 domestic; foreign mailing $5.50 additional, GPO): Part 3 is issued every 56 days and Part 3A is issued every 14 days. TD 4.12:pt. 3/.

Part 4—Graphic Notices—Supplemental Data. ($9.50 domestic; foreign mailing $2.50 additional, GPO): Issued quarterly. TD 4.12:pt. 4/.

For additional information concerning AIM, see Appendix I, page 63.

VFR/IFR PILOT EXAM-O-GRAMS. These brief summaries provide concise information about certain concepts and procedures that are critical to aviation safety.

A list of the Exam-O-Grams which were available at the time of this publication appears on pages 74 and 75. These summaries are free and may be obtained by contacting U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, Operations Branch, AAC–240, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

ADVISORY CIRCULARS. The FAA issues Advisory Circulars to inform the aviation public in a systematic way of non-regulatory material of interest. Advisory Circulars in the following subject categories are recommended for the Flight Instructor and can be obtained from:

U.S. Department of Transportation
Publications Section, TAD–443.1
Washington, D.C. 20590

Subject Number and Subject Matter

00.....General
20.....Aircraft
60.....Airman
70.....Airspace

90----------Air Traffic Control and General Operations

120----------Air Carrier and Commercial Operators and Helicopters

150----------Airports

170----------Air Navigation Facilities

FEDERAL AVIATION REGULATIONS. Suggested Parts for study are:

Part 1, Definitions and Abbreviations. ($3.00 domestic; $3.75 foreign GPO.)

Part 23, Airworthiness Standards—Normal, Utility, and Acrobatic Category Airplanes. ($3.55 domestic; $4.45 foreign GPO.)

Vol. IX —Part 61, Certification: Pilots and Flight Instructors. ($7.00 domestic; $8.75 foreign GPO.)

Vol. XI —Part 71, Designation of Federal Airways, Controlled Airspace, and Reporting Points. ($5.00 domestic; $6.25 foreign GPO.)

Part 91, General Operating and Flight Rules. ($11.30 domestic; $14.15 foreign GPO.)

Vol. VIII—Part 135, Air Taxi Operators and Commercial Operators of Small Aircraft. ($5.00 domestic; $6.25 foreign GPO.)

For the convenience of the user, the FAA is in the process of reissuing the FARs as individual Parts. For information regarding the status of this conversion and up-to-date prices, obtain a copy of:

AC 00–2 (latest revision) Advisory Circular Checklist and Status of Regulations.

This checklist may be obtained free by requesting it from:

U.S. Department of Transportation
Publications Section, TAD–443.1
Washington, D.C. 20590

AIRPLANE FLIGHT MANUALS AND OWNERS MANUALS. Aircraft manufacturers issue manuals for each aircraft model. They may be obtained from individual aircraft manufacturing companies or from local dealers and distributors.

HOW TO OBTAIN GPO PUBLICATIONS

1. Order blanks should be used when ordering FAA publications from GPO. These blanks (such as shown on page 77 of this guide) are free and may be duplicated by the user or they may be ordered from:

Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

2. Subscription and non-subscription items require separate order blanks.

3. The exact name and the Advisory Circular identification number should be included on the order blank in addition to the catalogue number, if available.

4. A check or money order for the *exact* amount is required. DO NOT SEND CASH.

5. If an order blank is not available, a letter may be used to request publications. In this case, be sure to enclose a self-addressed mailing label.

6. All prices are subject to change. Consult AC 00–2, "Advisory Circular Checklist and Status of Federal Aviation Regulations," for the current price of publications. It is very important that the *correct* amount be enclosed with the order.

In addition to the mail-order service provided by the Office of the Superintendent of Documents, several retail bookstores have been established throughout the country which constitute a part of the operations of the Superintendent of Documents. The public is encouraged to avail themselves of the services offered by these facilities as many of the more popular publications are stocked in these bookstores. These retail outlets are located at the following addresses:

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Atlanta, Ga. 30303
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Room 102A 2121 Bldg.
2121 Eighth Ave., N.
Birmingham, Ala. 35203
Phone: 205–325–6056

Boston GPO Bookstore
Room G25 John F. Kennedy Federal Bldg.
Sudbury St.
Boston, Mass. 02203
Phone: 617–223–6071

Canton GPO Bookstore
Federal Office Bldg.
201 Cleveland Ave.
Canton, Ohio 44702
Phone: 216–455–4354

Chicago GPO Bookstore
Room 1463—14th Floor
Everett McKinley Dirksen Bldg.
219 South Dearborn St.
Chicago, Ill. 60604
Phone: 312–353–5133

Cleveland GPO Bookstore
Room 171 Federal Bldg.
1240 East 9th St.
Cleveland, Ohio 44199
Phone: 216–522–4934

Dallas GPO Bookstore
Room 1C46 Federal Bldg.–U.S. Courthouse
1100 Commerce St.
Dallas, Texas 75202
Phone: 214–749–1541

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Federal Bldg.–U.S. Courthouse
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Denver, Co. 80202
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Detroit, Mich. 48226
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Kanasas City, Mo. 64106
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Los Angeles, Ca. 90012
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Milwaukee, Wisconsin 53202
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450 Golden Gate Ave.
San Francisco, Ca. 94102
Phone: 415–556–6657

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Room 190
915 2nd Ave.
Seattle, Wash. 98174
Phone: 206–442–4274

In addition, persons living within the metropolitan Washington, D.C., area may contact bookstores located at the following locations:

Government Printing Office Bookstore
710 North Capitol St.
Washington, D.C. 20402
Phone: 202–541–2091

Department of Commerce Bookstore
14th & Constitution Ave., NW
Washington, D.C. 20230
Phone: 202–967–3527

USIA Bookstore
1776 Pennsylvania Ave., NW
Washington, D.C. 20547
Phone: 202–632–9668

Department of State Bookstore
21st & C Sts., NW
Washington, D.C. 20520
Phone: 202–632–1437

Pentagon Bookstore
Main Concourse, south end
Washington, D.C. 20310
Phone: 202–541–2998

Forrestal Bookstore
Rm. 1-J-001
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1000 Independence Ave., SW
Washington, D.C. 20407
Phone: 202-426-7937

Mail Orders may also be directed to:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

STUDY OUTLINE
FUNDAMENTALS OF INSTRUCTING

I. THE LEARNING PROCESS

A. Definition of Learning.

B. Characteristics of Learning.
1. Learning is purposeful
2. Learning comes through experience
3. Learning is multifaced
4. Learning is an active process

C. Laws of Learning.
1. Law of readiness
2. Law of exercise
3. Law of effect
4. Law of primacy
5. Law of intensity
6. Law of recency

D. How People Learn.
1. Perceptions
2. Factors which affect perception
3. Insights
4. Motivation

E. Levels of Learning.

F. Learning Skills.
1. Physical skills involve more than muscles
2. Desire to learn
3. Patterns to follow
4. Perform the skill
5. Knowledge of results
6. Progress follows a pattern
7. Duration and organization of lesson
8. Evaluation versus critique
9. Application of skill

G. Forgetting and Retention.
1. Theories of forgetting
2. Retention of learning

H. Transfer of Learning.

I. Habit Formation.

J. Obstacles to Learning During Flight Instruction.

K. The Instructor's Role in Flight Training.

II. HUMAN BEHAVIOR

A. Control of Human Behavior.

B. Human Needs.
1. Physical needs
2. Social needs
3. Egoistic needs
4. Self-fulfillment needs

C. Defense Mechanisms.
1. Rationalization
2. Flight
3. Aggression
4. Resignation

D. The Instructor's Role in Human Relations.
1. Keep students motivated
2. Keep students informed
3. Approach students as individuals
4. Give credit when due
5. Criticize constructively
6. Be consistent
7. Admit errors

III. EFFECTIVE COMMUNICATION

A. Basic Elements of Communication Process.
1. Source
2. Symbols
3. Receiver

B. Barriers to Effective Communications.
1. Lack of common core of experience
2. Confusion between the symbol and the thing symbolized
3. Overuse of abstractions

IV. THE TEACHING PROCESS

A. Preparation.

B. Presentation.

C. Application.

D. Review and Evaluation.

V. TEACHING METHODS

A. Organizing Material.
   1. Introduction
   2. Development
   3. Conclusion

B. Lecture Method.
   1. Types of lectures
   2. Teaching lecture
   3. Preparing the teaching lecture
   4. Suitable language
   5. Types of delivery
   6. Use of notes
   7. Formal versus informal lectures
   8. Advantages and disadvantages of the lecture

C. Guided Discussion Method.
   1. Use of questions in a guided discussion
   2. Planning a guided discussion
   3. Student preparation for a guided discussion
   4. Guiding a discussion—instructor technique

D. Demonstration Performance Method.
   1. Explanation phase
   2. Demonstration phase
   3. Student performance and instructor supervision phases
   4. Evaluation phase

E. The "Telling and Doing" Technique in Flight Instruction.
   1. Instructor tells—instructor does
   2. Student tells—student does
   3. Student does—instructor evaluates

F. Programed Instruction.

VI. THE INSTRUCTOR AS A CRITIC

A. Purpose of a Critique.

B. Characteristics of an Effective Critique.

A critique should be—objective
—flexible
—acceptable
—comprehensive
—constructive
—well organized
—thoughtful
—specific

C. Methods of Critique.
   1. Instructor—student critique
   2. Student-led critiques
   3. Small-group critiques
   4. Individual student critique
   5. Written critique
   6. Self-critique

D. Ground Rules for Critiquing.

VII. EVALUATION

A. Oral Quizzing.
   1. Characteristics of effective questions
   2. Types of questions to avoid
   3. Answering students' questions

B. Written Tests.
   1. Characteristics of a good test
   2. Written test items
   3. Effective item writing
   4. Principles to follow

C. Performance Tests.
   1. Uses of performance testing
   2. Demonstrations of piloting ability

VIII. INSTRUCTIONAL AIDS

A. Theory Behind Use of Instructional Aids.

B. Reasons For Using Instructional Aids.

C. Guidelines For Use of Instructional Aids.

D. Types of Instructional Aids.
   1. Chalkboard
   2. Models
   3. Charts
   4. Projected material

E. Future Developments.

IX. FLIGHT INSTRUCTOR RESPONSIBILITIES

A. Professionalism.
   1. Sincerity
   2. Acceptance of the student
   3. Personal appearance and habits
   4. Demeanor
   5. Safety practices and accident prevention
   6. Proper language
   7. Self-improvement

B. Helping Student Pilots Learn.
   1. Providing adequate instruction
   2. Demanding an adequate standard of performance
   3. Emphasizing the "positive"

C. The Flight Instructor as a Practical Psychologist.
   1. Anxiety
   2. Normal reactions to stress
   3. Abnormal reaction to stress
   4. Instructor's actions regarding seriously abnormal students

D. Student Pilot Supervision and Surveillance.

E. Flight Instructor Endorsements.

F. Flight Test Recommendations.

G. Airplane Checkouts.

H. Refresher Training.

X. THE INTEGRATED METHOD OF FLIGHT INSTRUCTION

A. Definition.

B. Objectives.
   1. Development of habit patterns
   2. Accuracy of flight control
   3. Operating efficiency
   4. Emergency capability

C. Procedures.

D. Precautions.

E. Flight Instructor Qualifications.

XI. PLANNING INSTRUCTIONAL ACTIVITY

A. Course of Instruction.
   1. Determination of standards and objectives
   2. Identification of blocks of learning

B. Syllabus.
   1. Sample ground training syllabus
   2. Sample flight training syllabus

C. Lesson Plan.
   1. Characteristics of a well-planned lesson
   2. How to use a lesson plan properly
   3. Lesson plan items

STUDY OUTLINE

FLIGHT INSTRUCTOR-AIRPLANE KNOWLEDGE AREAS

I. FEDERAL AVIATION REGULATIONS

A. Parts 1 and 71: Definitions and Abb:eviations, and Controlled Airspace.

1. Air commerce
2. Airport traffic area
3. Ceiling
4. Commercial operator
5. Flight level
6. Flight visibility
7. Interstate air commerce
8. Large aircraft
9. Major alteration
10. Major repair
11. Pilot-in-command
12. Second-in-command
13. Federal airway
14. Control area
15. Continental control area
16. Control zone
17. Route segment
18. Terminal control area
19. Positive control area

B. Part 61: Certification: Pilots and Flight Instructors.

1. Required certificates/ratings
2. Certificates and ratings issued
3. Expired pilot certificates/reissuance
4. Carriage of narcotic drugs/marihuana
5. Duration of pilot certificates
6. Duration of medical certificates
7. General limitations
8. Pilot logbooks
9. Operations during medical deficiency
10. Second-in-command qualifications
11. Recent experience: Pilot-in-command
12. Pilot-in-command proficiency check
13. Falsification, reproduction, alteration
14. Change of address
15. Private pilot privileges/limitations
16. Commercial pilot privileges/limitations

C. Part 91: General Operating and Flight Rules—Subpart A—General.

1. Responsibility of pilot-in-command
2. Pilot-in-command/more than one pilot
3. Preflight action
4. Flight crewmembers at stations
5. Interference with crewmembers
6. Careless or reckless operation
7. Liquor and drugs
8. Dropping objects
9. Fastening of safety belts
10. Parachutes and parachuting
11. Portable electronic devices
12. ATC transponder equipment requirements
13. Civil aircraft: certificates required
14. Aircraft airworthiness
15. Aircraft operating limitations/markings
16. Supplemental oxygen
17. Instrument and equipment requirements
18. Limited/restricted aircraft limitations
19. Ferry flight with one engine inoperative
20. Emergency exits for airplanes
21. Aural speed warning device
22. Emergency locator transmitters
23. Report: aircraft identification/activity

D. Part 91: General Operating and Flight Rules—Subpart B—Flight Rules.

1. Waivers
2. Operating near other aircraft
3. Right-of-way rules
4. Aircraft speed
5. Acrobatic flight
6. Aircraft lights
7. Complying—ATC clearances/instructions
8. ATC light signals
9. Minimum safe altitudes; general
10. Altimeter settings
11. Flight plan; information required
12. Operation—in vicinity of airport
13. Operation—airport with control tower
14. Operation—airport without control tower

15. Flight in terminal control areas
16. Temporary flight restrictions
17. Flight test areas
18. Restricted and prohibited areas
19. Positive control areas; route segments
20. Basic VFR weather minimums
21. Special VFR weather minimums
22. VFR cruising altitude or flight level
23. ATC transponder test/inspection

E. Part 91: General Operating and Flight Rules—Subpart C—Maintenance, Preventive Maintenance, and Alterations.

1. General maintenance and alterations
2. Maintenance required
3. Carrying persons after repair/alteration
4. Inspections/progressive inspections
5. Altimeter system tests/inspections
6. Maintenance records/transfer of records
7. Rebuilt engine maintenance records
8. ATC transponder test/inspection

F. Part 135: Air Taxi Operators and Commercial Operators of Small Aircraft.

1. Subpart A—General
2. Subpart B—Rules—ATCO certificate holder
3. Subpart C—Operating rules
4. Subpart D—Crewmember qualifications
5. Subpart E—Aircraft and equipment

II. NATIONAL TRANSPORTATION SAFETY BOARD—PART 430

A. General.

1. Applicability
2. Definitions

B. Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft.

1. Immediate notification
2. Information to be given in notification

C. Preservation of Aircraft Wreckage, Mail, Cargo, and Records.

D. Reporting of Aircraft Accidents, Incidents, and Overdue Aircraft.

III. FAA ADVISORY CIRCULARS

A. Series 00—General.

B. Series 20—Aircraft.

C. Series 60—Airmen.

D. Series 70—Airspace.

E. Series 90—Air Traffic Control and General Operations.

F. Series 120—Air Carrier and Commercial Operators and Helicopters.

G. Series 150—Airports.

H. Series 170—Air Navigation Facilities.

IV. AIRMAN'S INFORMATION MANUAL

A. Part 1: Basic Flight Manual and ATC Procedures.

1. Glossary of aeronautical terms
2. Airport lighting/marking/aids
3. Air navigation radio aids
4. Visual approach slope indicator (VASI)
5. Controlled/uncontrolled airspace
6. Operating at non-tower airports
7. Special use airspace—prohibited, restricted, ISJTA, alert areas
8. Automatic terminal information service (ATIS)
9. ATC departure/en route/arrival procedures
10. Radar traffic information service
11. Terminal radar program for VFR aircraft
12. Aeronautical advisory stations (UNICOM)
13. Radiotelephone phraseology/technique
14. Traffic/wind direction indicators
15. Obtaining weather information/briefing
16. Flight plans
17. ADIZ and designated mountainous areas
18. Medical facts for pilots
19. Good operating practices

B. Part 2: Airport Directory.

1. Obtaining airport/heliport data
2. FSS/weather service telephone numbers

C. Part 3: Operational Data and Notices to Airmen.

1. Obtaining radio facility/FSS data
2. Special notices/special operations
3. Notices to Airmen (NOTAMS)

D. Part 4: Graphic Notices and Supplemental Data.

1. Terminal radar service areas (TRSA's)
2. Terminal area graphic notices
3. Restrictions to en route navigation aids
4. VOR receiver checkpoints
5. Parachute jumping areas
6. Heavy wagon and olive branch routes

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V. AVIATION WEATHER

A. The Earth's Atmosphere.
1. Composition
2. Vertical structure
3. The standard atmosphere
4. Density

B. Temperature.
1. Temperature measurement
2. Heat and temperature
3. Temperature aloft
4. Temperature variation

C. Atmospheric Pressure and Altimetry.
1. Atmospheric pressure measurements
2. Sea level pressure
3. Station pressure
4. Pressure variations
5. Pressure systems
6. Altimeters

D. Wind.
1. Basic theory of general circulation
2. Convection
3. Pressure gradient force
4. Coriolis force
5. Friction
6. The jet stream
7. Local and small scale winds
8. Large wind system
9. Wind, pressure systems, and weather
10. Wind shear

E. Moisture.
1. Measurements
   (a) Relative humidity
   (b) Dewpoint
2. Change of state
3. Condensation and sublimation products

F. Stability and Instability.
1. Adiabatic process
2. Lapse rates
3. Stability determinations
4. Effects of stability or instability

G. Clouds.
1. Composition
2. Formation and structure
3. Types
4. Recognition

H. Air Masses.
1. Source regions
2. Classification of air masses
3. Air mass modification
4. Summer and winter air mass weather

I. Fronts.
1. Structures
2. Types
3. Frontal waves and occlusions
4. Frontolysis and frontogenesis
5. Associated weather

J. Turbulence.
1. Convective currents
2. Obstructions to wind flow
3. Wind shear
4. Clear air turbulence
5. Categories of turbulence intensities
6. Wake turbulence

K. Icing.
1. Ice-producing cloud types
2. Structural ice formation
3. Types and intensities of in-flight structural icing
4. Accretion rate of in-flight structural icing
5. Effects of in-flight structural icing
6. Structural aircraft icing and frost on the ground
7. Structural anti-icing and deicing
8. Instrument and powerplant icing
9. Fuel and oil anti-icing

L. Thunderstorms.
1. Conditions necessary for formation
2. Structure
3. Classification
4. Hazards
5. Information from radar
6. Tornadoes
7. Do's and don'ts of thunderstorm flying

M. Common IFR Producers.
1. Fog
2. Low stratus clouds
3. Haze and smoke
4. Blowing obstructions to vision
5. Precipitation
6. Obscured or partially obscured sky

N. The Nation's Aviation Weather Reporting System.

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O. Weather Observations.
1. Surface weather observations
2. Pilot reports (PIREPS)
3. Weather radar observations
4. Upper air observations

P. Weather Charts.
1. Weather depiction charts
2. Surface weather charts
3. Constant pressure charts
4. Winds aloft charts
5. Radar summary charts
6. Prognostic surface and prognostic constant pressure charts
7. Prognostic significant weather charts

Q. Aviation Weather Forecasts.
1. Terminal forecasts (FT)
2. Area forecasts (FA)
3. Winds aloft forecasts (FD)
4. In-flight weather advisories
5. Severe weather outlooks (AC)
6. Severe weather forecasts (WW)
7. Surface analysis and prognoses

R. Services to Pilots.
1. FSS briefing
2. Automatic terminal information service
3. Pilots automatic telephone weather answering service (PATWAS)
4. Transcribed weather broadcasts
5. En route flight advisory service

VI. AIRPLANE OPERATION

A. General.
1. Preflight/postflight safety practices
2. Use of mixture/throttle/propeller control
3. Use of proper fuel grade/type
4. Fuel system operation
5. Fuel contamination—prevention/elimination
6. Wake turbulence—causes/precautions
7. Crosswind takeoff/landing
8. Proper loading of the aircraft
9. Recovery from critical flight situations
10. Aircraft operating limitations
11. High-altitude operations/pressurization
12. Use of supplemental oxygen and oxygen equipment
13. Midair collision avoidance precautions
14. Normal/crosswind takeoff/landing
15. Maximum performance takeoff/landing
16. Emergency landings
17. Maneuvering speed
18. Taxiing during strong surface winds
19. Flap operation
20. Retractable landing gear operation
21. Controllable pitch propeller operation
22. Supercharged engine operation
23. Multi-engine critical engine failure

B. Performance.
1. Takeoff charts
2. Rate-of-climb charts
3. Cruise charts
4. Maximum safe crosswind charts
5. Use of Denalt computer
   (a) Fixed pitch propeller
   (b) Variable pitch propeller
6. Landing charts
7. Stall speed charts
8. Airspeed correction charts
9. Computing density/pressure altitudes
10. Effect of density altitude on performance
11. Critical performance speeds—"V" speeds
12. Effect of wind on aircraft performance
13. Bank/speed versus rate/radius of turns
14. Stall speed versus altitude or attitude
15. Stall speed versus indicated/true airspeed
16. Obstacle clearance takeoff/landing
17. Best angle-/rate-of-climb
18. Computations of gross weight/useful load
19. Computation of center of gravity

VII. ENGINE OPERATION

A. Fuel injection/carburetor principles.
B. Reciprocating engine principles.
C. Engine starting/shutdown.
D. Detonation cause/effect.
E. Carburetor icing—cause/detection/elimination.
F. Manifold pressure versus RPM.
G. Carburetor heat effect on mixture.
H. Ignition or electrical systems/units.
I. Interpreting engine instruments.
J. Emergency—engine/systems/equipment/fire.

VIII. FLIGHT INSTRUMENTS AND SYSTEMS

A. Attitude indicator operation/errors.
B. Heading indicator operation/errors.

C. Turn indicator/coordinator.
D. Altimeter operation/errors.
E. Vertical speed indicator operation/errors.
F. Airspeed indicator operation/errors.
G. Vacuum systems/instruments.
H. Pitot-static systems/instruments.
I. Magnetic compass operation/errors.
J. Altimeter setting procedure/significance.
K. Pressure altitude significance/obtaining.
L. Gyroscopic principles.

IX. RADIO COMMUNICATIONS

A. VHF radio communications/phraseology.
B. Position reporting procedures.
C. Tower/FSS/en route advisories/instructions.
D. FSS communications procedures.
E. Obtaining emergency assistance.
F. Lost procedure when radio is inoperative.
G. Use of proper communications frequencies.

X. INSTRUMENT FLYING PROCEDURES

A. Components of attitude instrument flying.
B. Pitch, bank, power control.
C. Straight-and-level flight.
D. Turns/turns to predetermined headings.
E. Constant rate climbs/descents/leveloffs.
F. Constant speed climbs/descents/leveloffs.
G. Magnetic compass turns.
H. Effect of changes in airspeed.
I. False sensations in flight.

XI. NAVIGATION

A. General.
1. Sectional chart interpretation
2. Relating chart symbols to regulations
3. Pilotage/recognition of landmarks
4. Determining courses/distances on charts
5. Navigation computer principles
6. Computing heading/courses
7. Computing time, distance, speed, fuel
8. Computing rates of climb/descent
9. Computing wind directions/speed in-flight
10. Computing off-course corrections
11. Selecting VFR cruising altitudes
12. Planning traffic pattern entry

B. Radio.
1. Characteristics of VOR facilities
2. Tuning VOR receivers
3. Identifying VOR stations
4. VOR interpretation/orientation
5. Intercepting VOR radials
6. Tracking VOR radials
7. Groundspeed checks using VOR radials
8. VOR frequency interference
9. VOR test signals/VOR receiver checks
10. Characteristics of ADF facilities
11. Tuning ADF receivers
12. Identifying stations used for ADF
13. ADF/RMI interpretation/orientation
14. Intercepting ADF/RMI bearings
15. Tracking ADF/RMI bearings or "homing"
16. Marker beacons/outer compass locators

XII. AERODYNAMICS AND PRINCIPLES OF FLIGHT

A. Laws of motion.
B. Functions of the flight controls.
C. Principles of airfoils.
D. Wing planform.
1. Area/span/chord
2. Aspect ratio/taper/sweepback
3. Effect of planform on stall patterns
E. Forces acting on an airplane.
F. Flight controls/axes of an airplane
G. Lift/drag during turns.
H. Lift versus angle of attack.
I. Lift/thrust versus air density.
J. Types/effect of flaps, spoilers, divebrakes.
K. Effect of flaps on lift/drag/trim.
L. Effect of ice/snow/frost on airfoils
M. Power versus climb/descent/level flight.
N. Gyroscopic precession.
O. Types and effect of drag—induced/parasite/profile.
P. Ground effect.
Q. Loads/load factors.
R. Stability—static and dynamic/longitudinal/lateral/directional.
S. Stalls/spins.
T. Relative wind/angle of attack.
U. Effect of wind during turns.
V. Torque effects—"P" factor.

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SAMPLE TEST ITEMS

The following test items are presented to familiarize the applicant with the type of test items he may expect to find on both the Fundamentals of Instructing and the Flight Instructor-Airplane Written Tests. All the subjects on which the applicant will be tested are *not* included in these sample test items. Therefore, the ability to answer these items correctly should not indicate to the applicant that he is fully prepared to take either test.

The applicant should concentrate on the appropriate study outline provided in this guide. A knowledge of all topics listed in these outlines, not just mastery of the sample test items, should be used as the criterion for determining that he is properly prepared to take the appropriate test. Proper preparation requires considerable time and effort and the guidance of a competent instructor.

In some test items, reference is made to certain illustrations which are located in the appendices of this guide and are representative of those used with the Flight Instructor—Airplane—Written Tests.

FUNDAMENTALS OF INSTRUCTING
SAMPLE TEST ITEMS

1. The highest level of learning has been achieved when the student is able to—

1—understand what has been taught.
2—repeat back something that has been taught.
3—apply the skill that has been learned.
4—correlate what has been learned with other things previously learned.

Response 4 is the correct answer. Learning may be accomplished at any of several levels. The lowest level, *rote learning,* is the ability to repeat back something which one has been taught without understanding or being able to apply what has been learned. Progressively higher levels of learning are *understanding* what has been taught, achieving the *skill to apply* what has been learned and to perform correctly, and associating and *correlating* what has been learned with other things previously learned or subsequently encountered.

2. When a student cannot accept the real reason for his behavior, he may attempt to alleviate his feeling of guilt by relying on the defense mechanism called—

1—flight.
2—rationalization.
3—aggression.
4—resignation.

Response 2 is the correct answer. If a student cannot accept the real reason for his behavior, he may rationalize.

3. Which statement is true regarding effective communication?

1—To be most effective as a communicator, an instructor should use abstract words as much as possible.
2—The most effective communicator relies on a single, proven channel to transmit his ideas.
3—Unless a common core of experience exists between the communicator and the receptor, effective communication will be difficult to achieve.
4—Effective communication has taken place when the receiver acknowledges receipt of the information.

Response 3 is the correct answer. Probably the greatest single barrier to effective communication is the lack of a common core of experience between communicator and receptor. Communication can be effective only to the extent that the experiences—physical, mental, or emotional—of the people concerned are similar.

4. For presenting new material, the lecture method is excellent; it is most effective when—

1—accompanied by training devices and visual aids.
2—notes are used extensively.
3—motor skills are to be taught.
4—facts and ideas are to be formulated during the presentation.

Response 1 is the correct answer. The *lecture method* is suitable for presenting new material, for summarizing ideas, and for relationships between theory and practice. For example, it is suitable for the presentation of a ground school lesson on basic instrument flying. This method is most effective if accompanied by visual aids and training devices.

5. Flight instructors can minimize student anxiety by—

1—giving brisk instruction.
2—keeping the student busy while airborne.
3—emphasizing the positive rather than the negative experiences of flying.
4—terminating the flight period immediately upon detecting student fear.

Response 3 is the correct answer. Student anxieties can be minimized throughout training by emphasizing the benefits and pleasurable experiences which can be derived from flying, rather than continuously citing the unhappy consequences of faulty performance.

FLIGHT INSTRUCTOR-AIRPLANE KNOWLEDGE AREAS
SAMPLE TEST ITEMS

1. A flight instructor certificate expires at the end of the—

   1—6th month after the month it was last issued or renewed.

   2—12th month after it was issued or renewed.

   3—24th month after the month in which it was last issued or renewed.

   4—36th month after it was issued or renewed.

Response 3 is the correct answer. Refer to Federal Aviation Regulations, Part 61 (revised), which says: "A flight instructor certificate—

   (1) Is effective only while the holder has a current pilot certificate and a medical certificate appropriate to the pilot privileges being exercised; and

   (2) Expires at the end of the 24th month after the month in which it was issued or renewed."

2. Using the appropriate information on page 36 and the charts on page 37, determine the center of gravity of the Condor 410 under the following conditions:

Pilot and front passenger weight	360.0 lbs.
Rear passenger weight	120.0 lbs.
Baggage	100.0 lbs.
Fuel	63.5 gals.
Oil	12.0 qts.

Under these conditions, the center of gravity would be located—

   1—well within the CG envelope; the loading would be acceptable.

   2—well forward of the forward CG limit; the loading would be unacceptable because the airplane would be dangerously nose-heavy.

   3—well aft of the aft CG limit; the loading would be unacceptable because the airplane would be dangerously tail-heavy.

   4—within the CG envelope, but the loading would be unacceptable because the maximum allowable gross weight would be exceeded.

Response 1 is the correct answer. Applying the given information to the loading graph, the following conclusions are made:

		Weight Moment/1000
Airplane empty weight	1,840.0	+63.7
Pilot and front passenger	360.0	+13.0
Rear passenger	120.0	+ 8.4
Baggage	100.0	+10.4
Fuel (6.0 lbs. per gal.)	381.0	+18.2
Oil (7.5 lbs. per gal.)	22.5	− 0.4
Totals	2,823.5	113.3

Drawing a parallel line on the center of gravity moment envelope from left to right (2,823.5 lbs.) and a vertical line from bottom to top (113.3/1,000 lbs.-ins.), the center of gravity is located where the two lines intersect—at a point well within the center of gravity envelope.

3. Areas of forecast icing conditions aloft can be determined by referring to—

   1—aviation sequence reports.

   2—terminal forecasts.

   3—weather depiction charts.

   4—area forecasts.

Response 4 is the correct answer. Refer to AC 00-6, Aviation Weather, which states:

"Area forecasts include forecasts of cloud tops, icing, turbulence, and other hazards for use in preflight briefing". The correct answer is further verified by the additional statement, ". . . includes a statement of expected icing conditions plus the height of the freezing level."

4. Given:

Airplane gross weight	3,000 lbs.
Pressure altitude	5,000 feet
Ambient temperature	66° F.
Headwind speed	15 MPH
Runway	Hard surface
Flaps	20°

Based on the given information and using the Take-off Data Performance Chart on page 38, the total distance required to clear a 50-foot obstacle would be approximately—

1—660 feet.
2—820 feet.
3—1,215 feet.
4—1,337 feet.

Response 4 is the correct answer. Applying the given information to the Take-off Data Chart, the total distance to clear a 50-foot obstacle at 5,000 feet with a 15 MPH headwind would be 1,215 feet (as listed on the chart). However, the temperature is 25° F. above standard for that altitude. According to the performance chart, the distance should be increased by 10% for each 25° F. above standard temperature for a particular altitude. With these facts established, the following computations verify the correct answer:

(A) 1,215 feet (as listed on the chart)
x .10 (temperature 25° F. above standard)
121.50

(B) 1,215.0
+121.5
1,336.5 feet or 1,337 feet.

5. Given:

Distance off course	8.5 miles
Distance flown	51 miles
Distance to fly	128 miles

To converge, the *total* correction angle would be—

1— 4°.
2—10°.
3—14°.
4—24°.

Response 3 is the correct answer. Using a navigation computer, place the miles flown on the *inner* scale opposite the miles off course on the *outer* scale. Read the degrees to parallel on the *outer* scale opposite the speed arrow index (in this case, 10°). Then place the miles to be flown on the *inner* scale opposite the miles off course on the *outer* scale. Read the degrees to converge from parallel on the *outer* scale opposite the speed arrow index (in this case, 4°). By adding these two figures, the total correction to converge would be 14°.

ADDITIONAL QUESTIONS FOR STUDY

Because the following questions are offered for the sole purpose of encouraging student interest, answers and explanations are not included. Here again, the applicant should be aware that these questions do not cover all those subject areas found on the Fundamentals of Instructing or Flight Instructor-Airplane written tests.

1. What is the definition of "learning?"
2. During the learning process, most knowledge is acquired through which sense?
3. What is probably the dominant force which governs a student's progress and ability to learn?
4. The teaching process can be broken down into how many steps?
5. What is the primary purpose of a critique?
6. What is the most important feature of any written test?
7. When can a written test be termed reliable?
8. What precautions should be taken when using instructional aids?
9. When a student demonstrates a lack of confidence in learning a new maneuver, what can an instructor do to alleviate this problem?
10. What is the purpose of integrated flight instruction?
11. Lesson plans and course syllabi should be followed exactly if maximum benefit is to be derived from their use. Is this statement true?
12. What factor should the instructor consider when determining the length and frequency of flight instruction periods?
13. What is the purpose of performance tests?
14. "Insights" and "perceptions" are involved in the learning process in what manner?
15. Why should an instructor avoid negative teaching?
16. Certain recency of experience requirements are mandatory prior to conducting night operations with passengers aboard. What are these requirements?
17. Under what circumstances may a private pilot receive compensation when acting as pilot in command of an aircraft?
18. What is the difference between control zones and control areas?
19. Are "Airport Traffic Areas" depicted on aeronautical charts?
20. What effect will a lower than standard temperature have upon an altimeter?
21. Rather than flowing directly from high pressure areas to low pressure areas, air tends to flow parallel to isobars and contours. Why?
22. Is cold dry air more dense than cold moist air?
23. How can one tell when an individual thunderstorm has reached its mature stage of development?
24. What is the most serious type of in-flight structural icing?
25. What is the difference between pressure altitude and density altitude?
26. What effect does high ambient temperature have on aircraft performance?
27. What should the absence of a VOR station identifier signify to a pilot?
28. When transponder equipped, how can a pilot alert ATC that radio communications failure has occurred?
29. How are wingtip vortices generated?
30. What is the difference between "hypoxia" and "hyperventilation?"

APPENDICES

The following material is presented to encourage further study in selected subject areas, and should be used for study purposes only. Because certain data may become obsolete, *under no circumstances* should any information herein be used for operational purposes.

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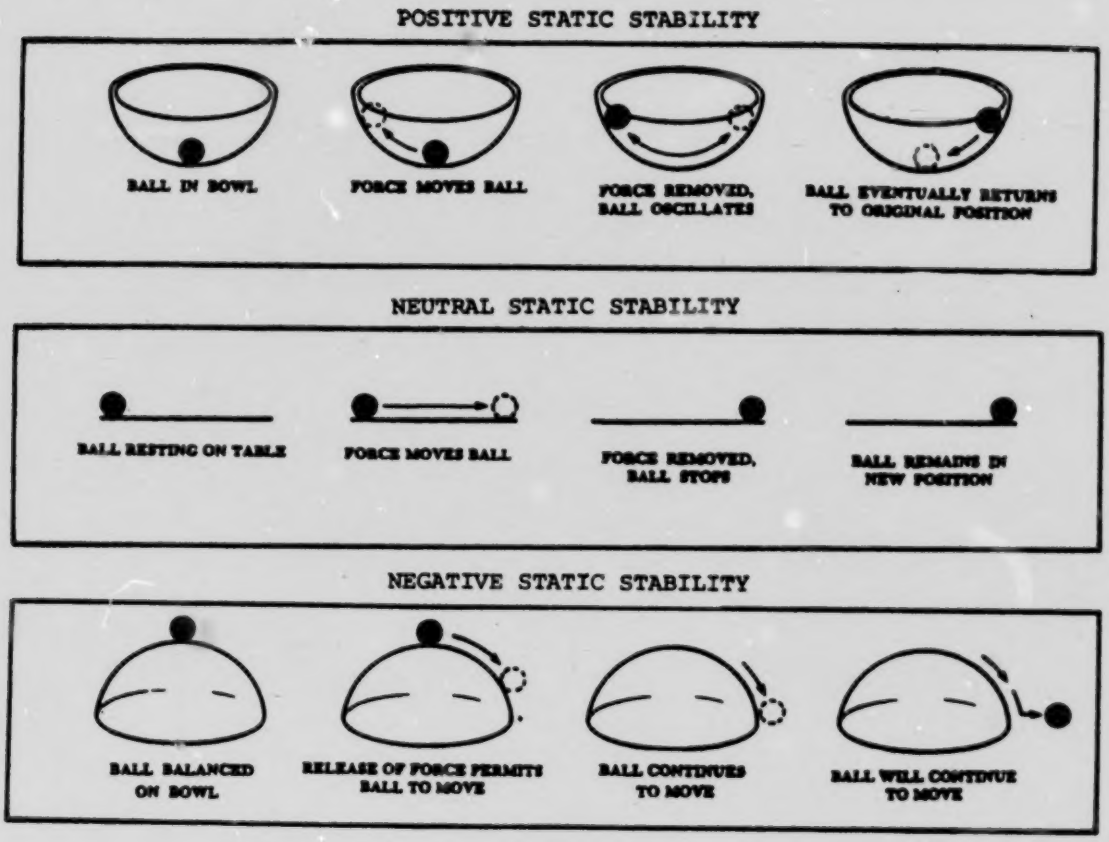
POSITIVE STATIC STABILITY
BALL IN BOWL
FORCE MOVES BALL
FORCE REMOVED, BALL OSCILLATES
BALL EVENTUALLY RETURNS TO ORIGINAL POSITION
NEUTRAL STATIC STABILITY
BALL RESTING ON TABLE
FORCE MOVES BALL
FORCE REMOVED, BALL STOPS
BALL REMAINS IN NEW POSITION
NEGATIVE STATIC STABILITY
BALL BALANCED ON BOWL
RELEASE OF FORCE PERMITS BALL TO MOVE
BALL CONTINUES TO MOVE
BALL WILL CONTINUE TO MOVE

FIGURE 1. Types of stability.

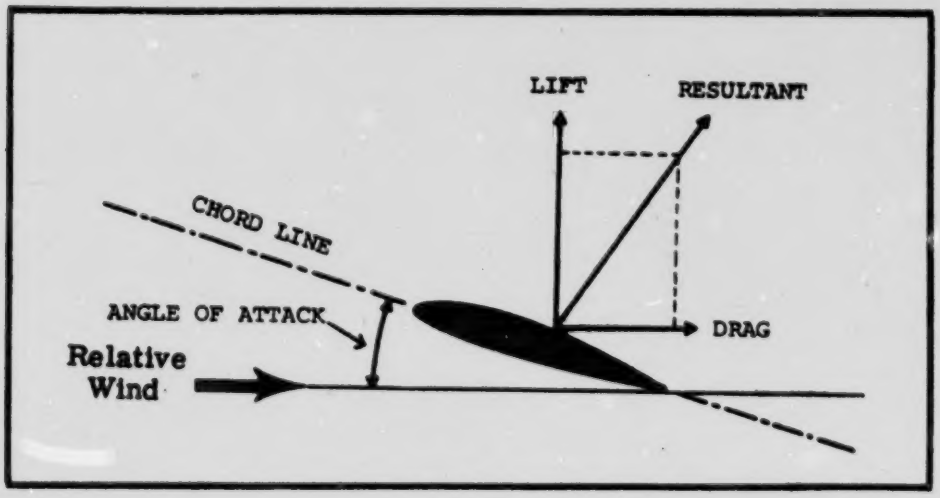

FIGURE 2. Relative wind—airfoil.

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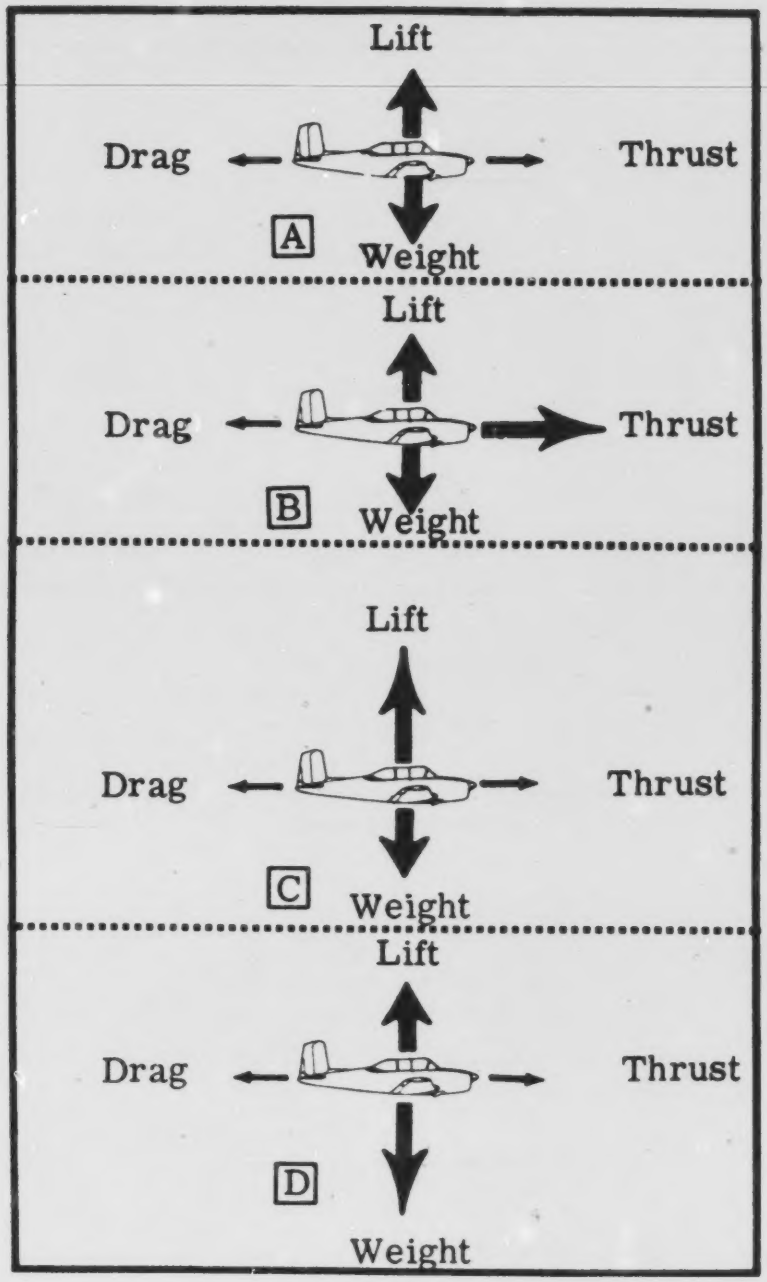

FIGURE 3. Forces acting on an airplane.

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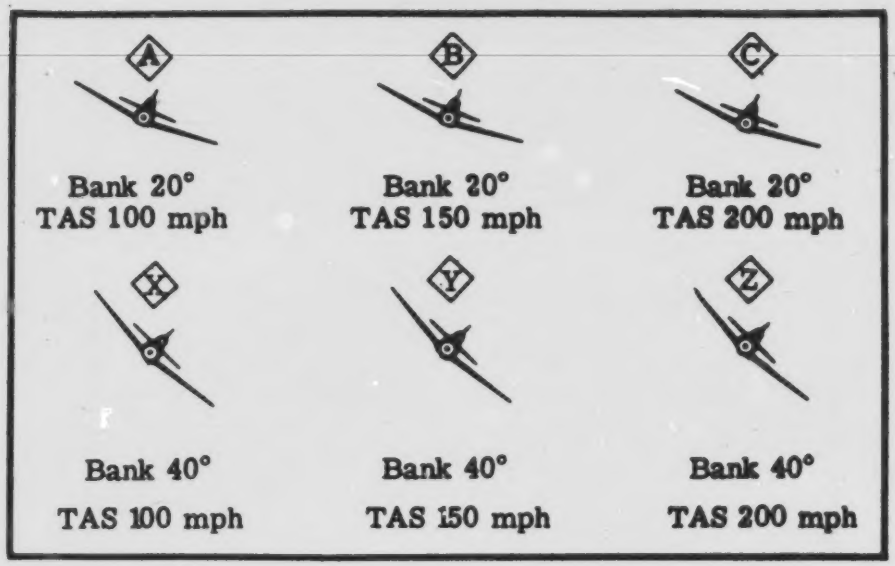

FIGURE 4. Bank versus airspeed.

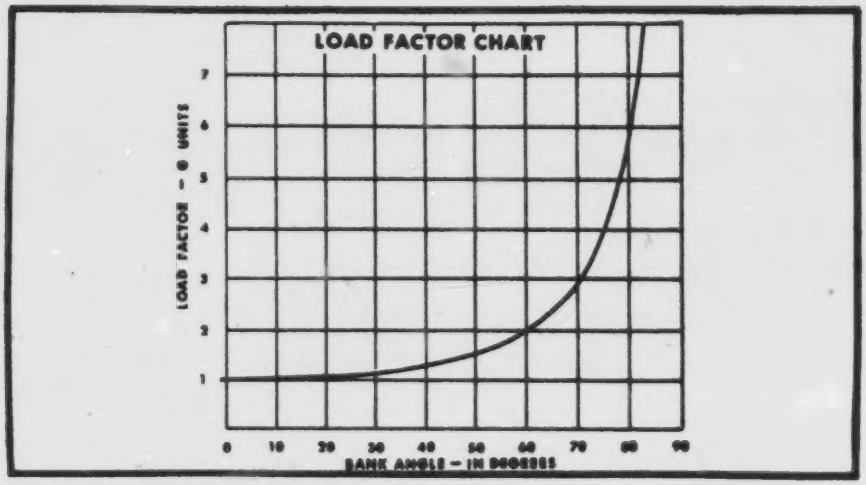

FIGURE 5. Load factor chart.

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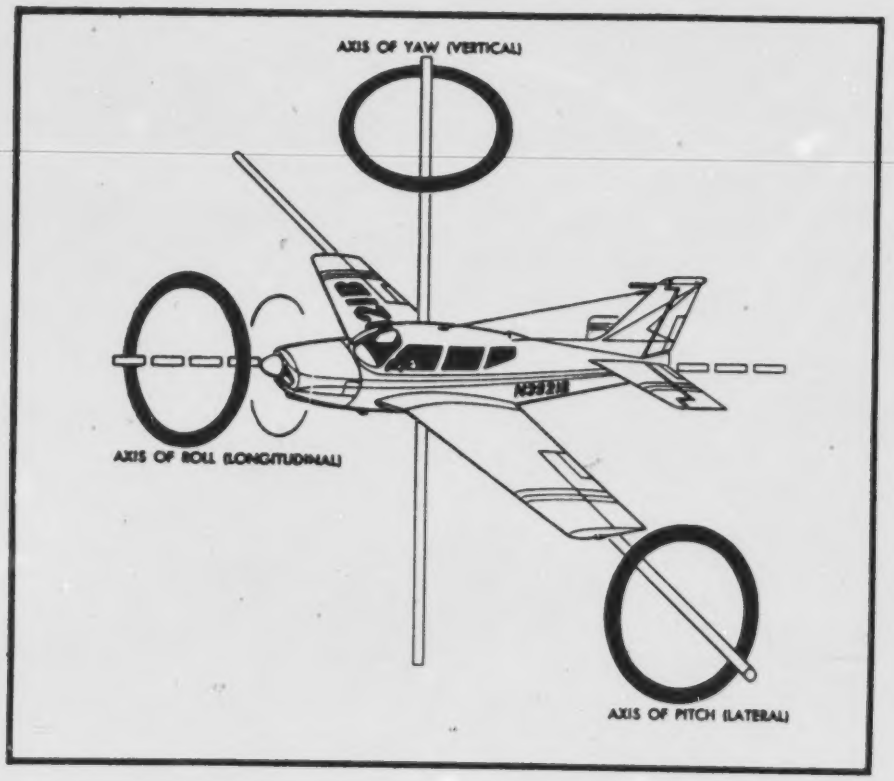

FIGURE 6. Axes of rotation.

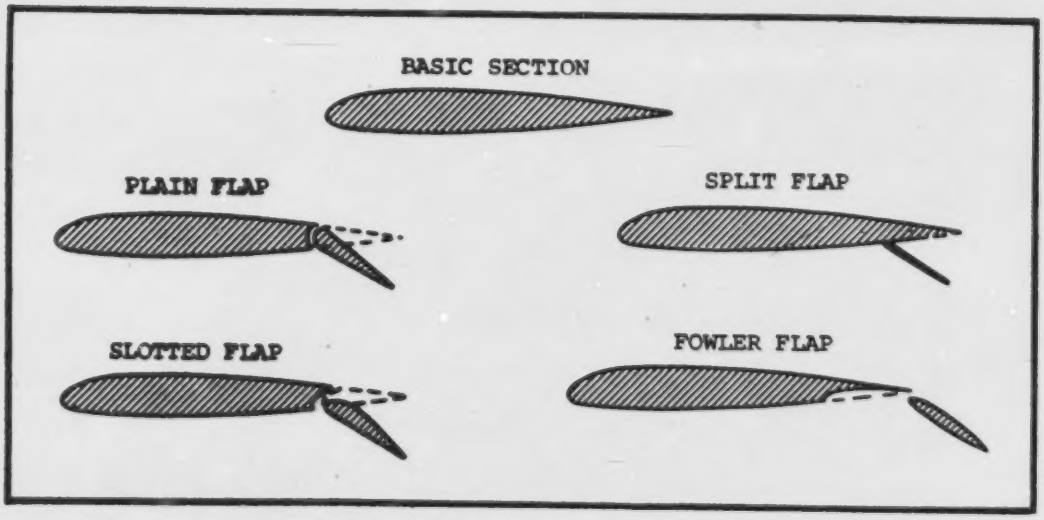

FIGURE 7. Flap configurations.

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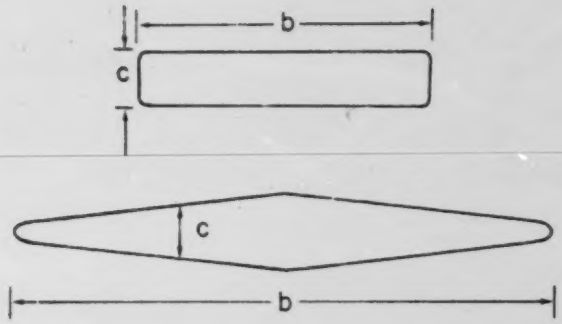
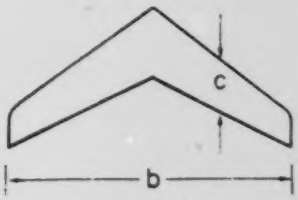


S = WING AREA, SQ. FT.

b = SPAN, FT.

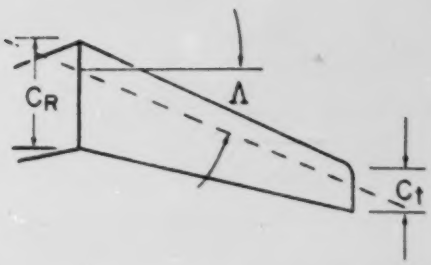
c = AVERAGE CHORD, FT.



AR = ASPECT RATIO

$AR = b/c$

$AR = b^2/s$



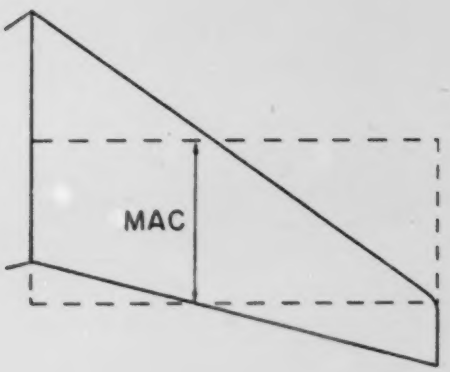
C_R = ROOT CHORD, FT.

C_t = TIP CHORD, FT.

λ = TAPER RATIO

$\lambda = C_t/C_R$

Λ = SWEEP ANGLE, DEGREES



MAC = MEAN AERODYNAMIC CHORD, FT.

FIGURE 8. Descriptions of wing planform.

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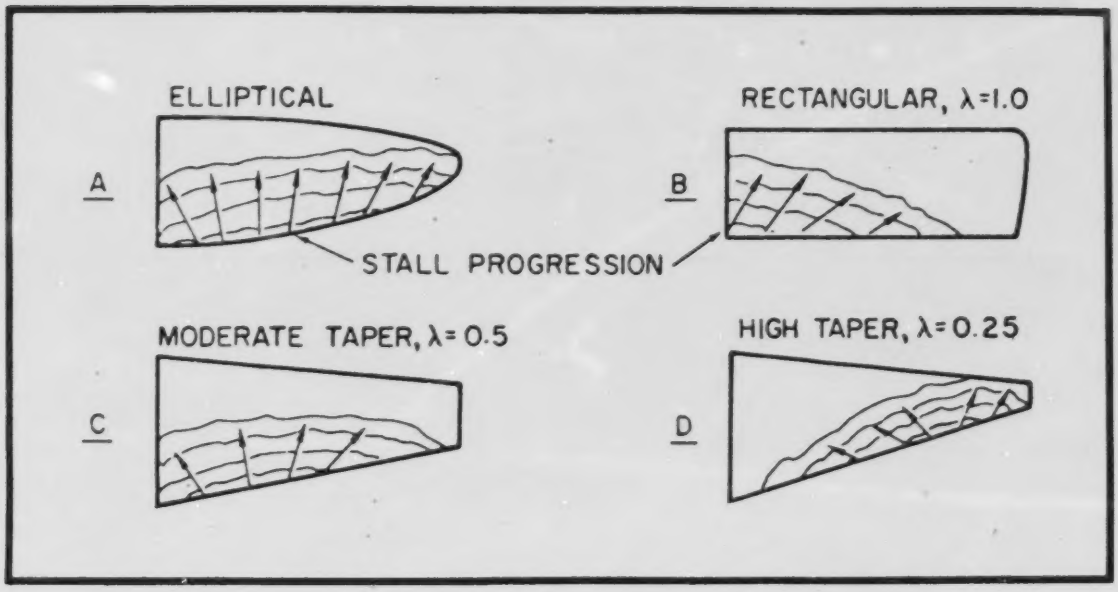

FIGURE 9. Stall patterns.

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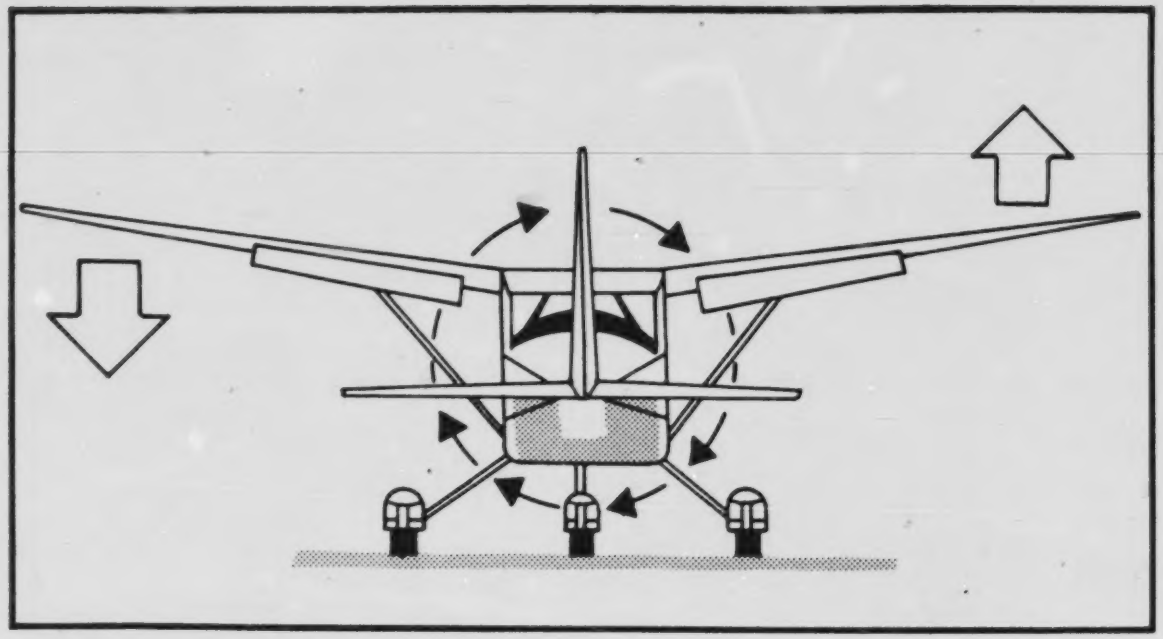

FIGURE 10. Torque reaction.

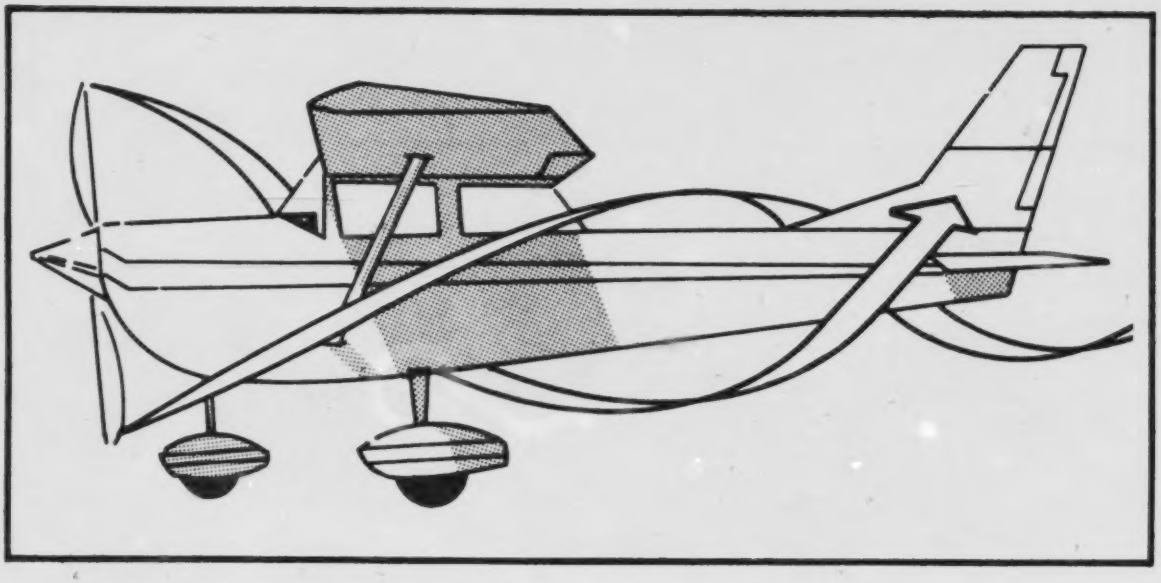

FIGURE 11. Slipstream corkscrew effect.

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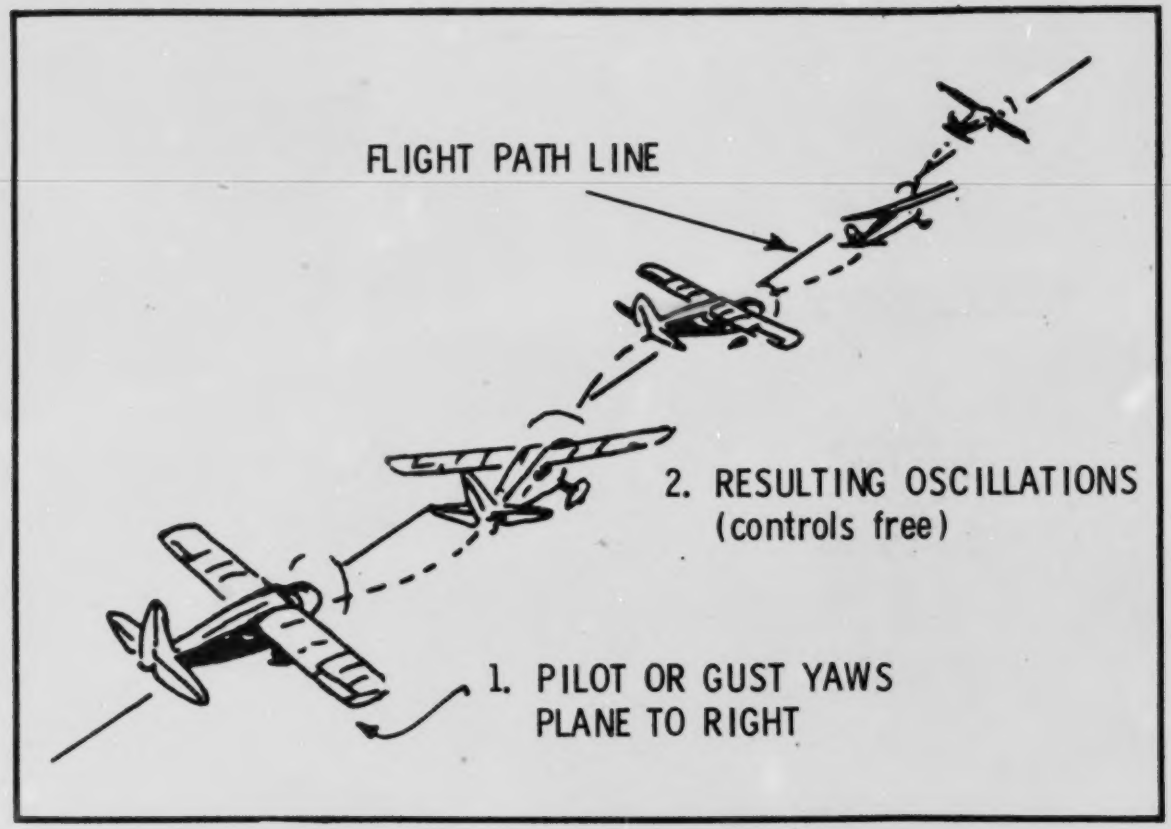

FIGURE 12. Dutch roll.

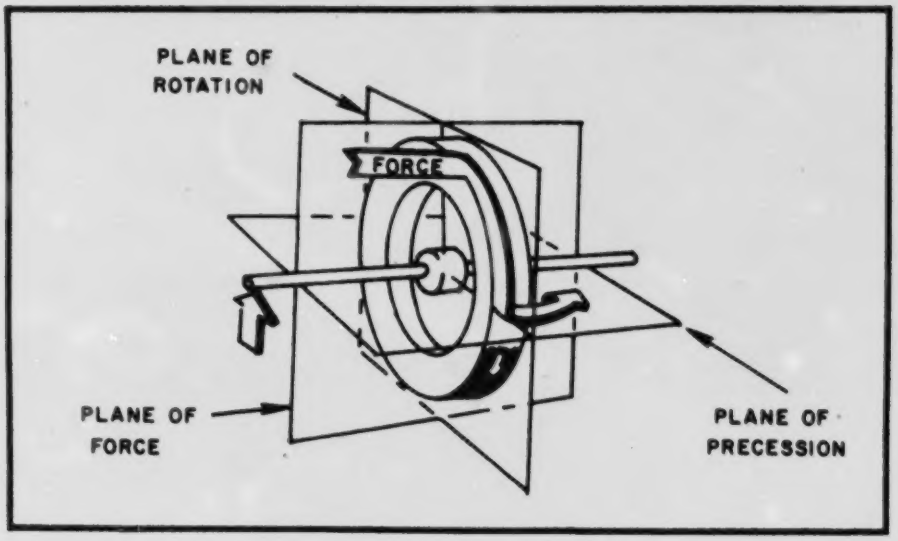

FIGURE 13. Gyroscopic precession reaction.

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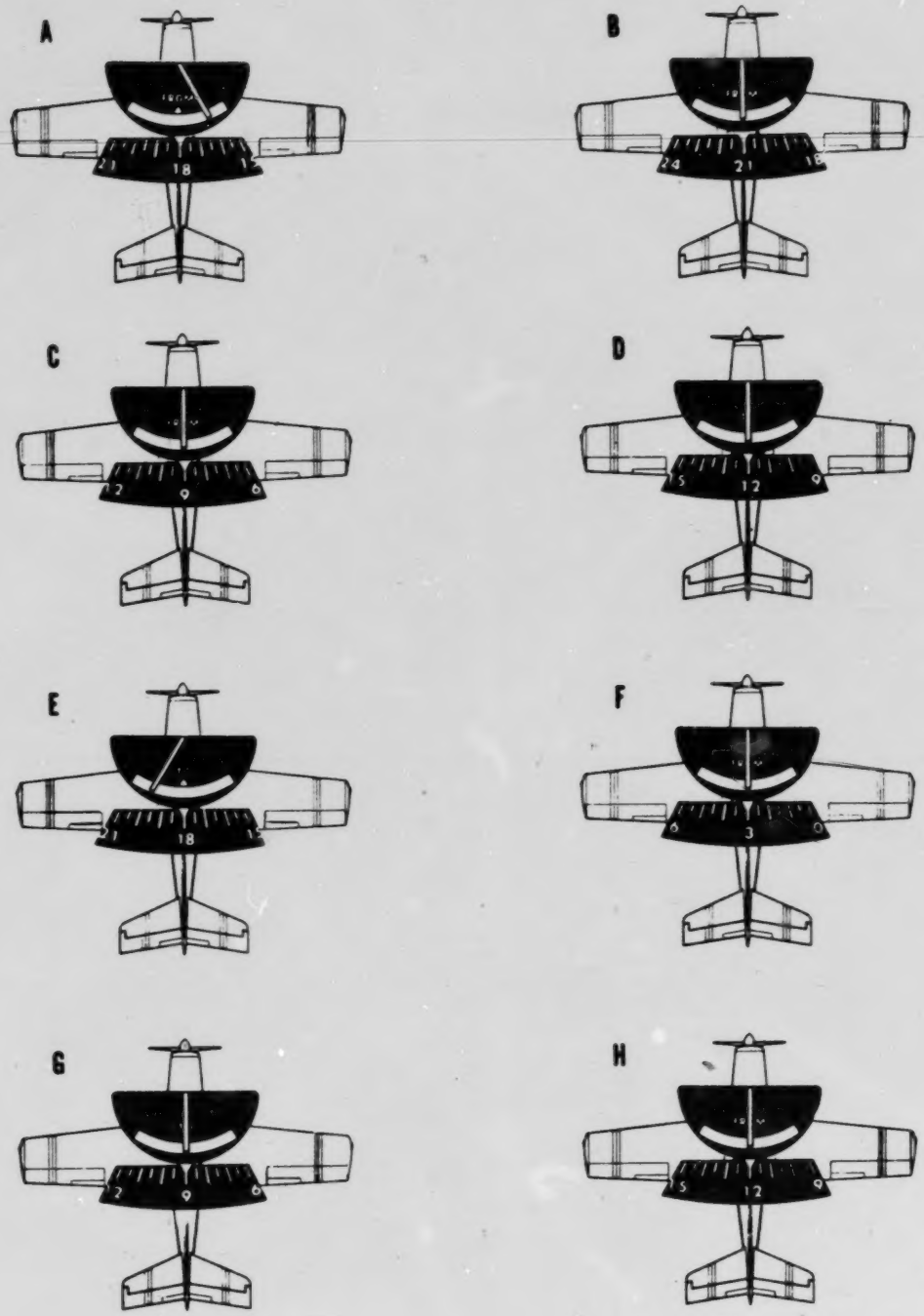

FIGURE 14. VOR orientation.

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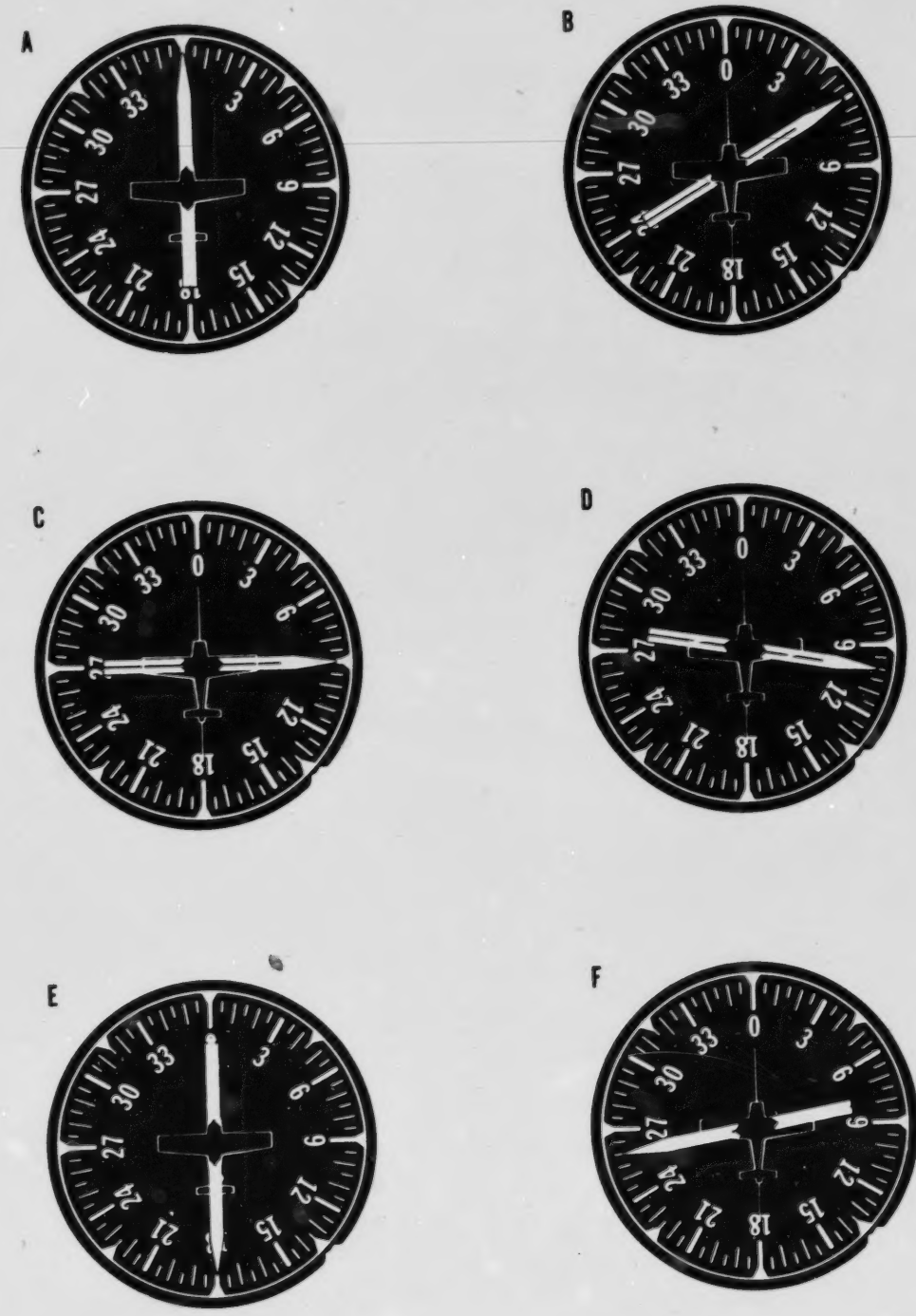

FIGURE 15. ADF orientation.

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DENALT PERFORMANCE COMPUTER
USE WITH VARIABLE PITCH PROPELLER AIRPLANES
AIR TEMP
100
PRESSURE ALTITUDE
TAKEOFF FACTOR
PERCENT ROC
PROCEDURE TO FIND
EXPECTED RATE OF CLIMB
1. Set airplane altimeter to 29.92 inches
2. Altimeter now indicates your PRESSURE ALTITUDE.
3. Read AIR TEMP directly from your outside air temperature gauge in degrees Fahrenheit
4. Rotate DENALT PERFORMANCE COMPUTER until reading nearest your current AIR TEMP appears in AIR TEMP window
5. Read the PERCENT R O C opposite nearest PRESSURE ALTITUDE
6. Multiply PERCENT R O C by the normal sea level rate of climb made by your airplane at standard conditions and present gross weight
7. THIS figure is the RATE OF CLIMB to be expected from your airplane at your present ALTITUDE and TEMPERATURE conditions
PROCEDURE TO FIND
EXPECTED TAKEOFF DISTANCE
AIR TEMP
90
AIR TEMP
80
NOTES:
+ Much greater than normal; check manufacturer's specifications.
– Less than normal distance; check manufacturer's specifications.
• General data not pertinent; check manufacturer's specifications.
The DENALT PERFORMANCE COMPUTER is intended to supplement and NOT replace manufacturer's published performance information.

FIGURE 16. DENALT performance computer.

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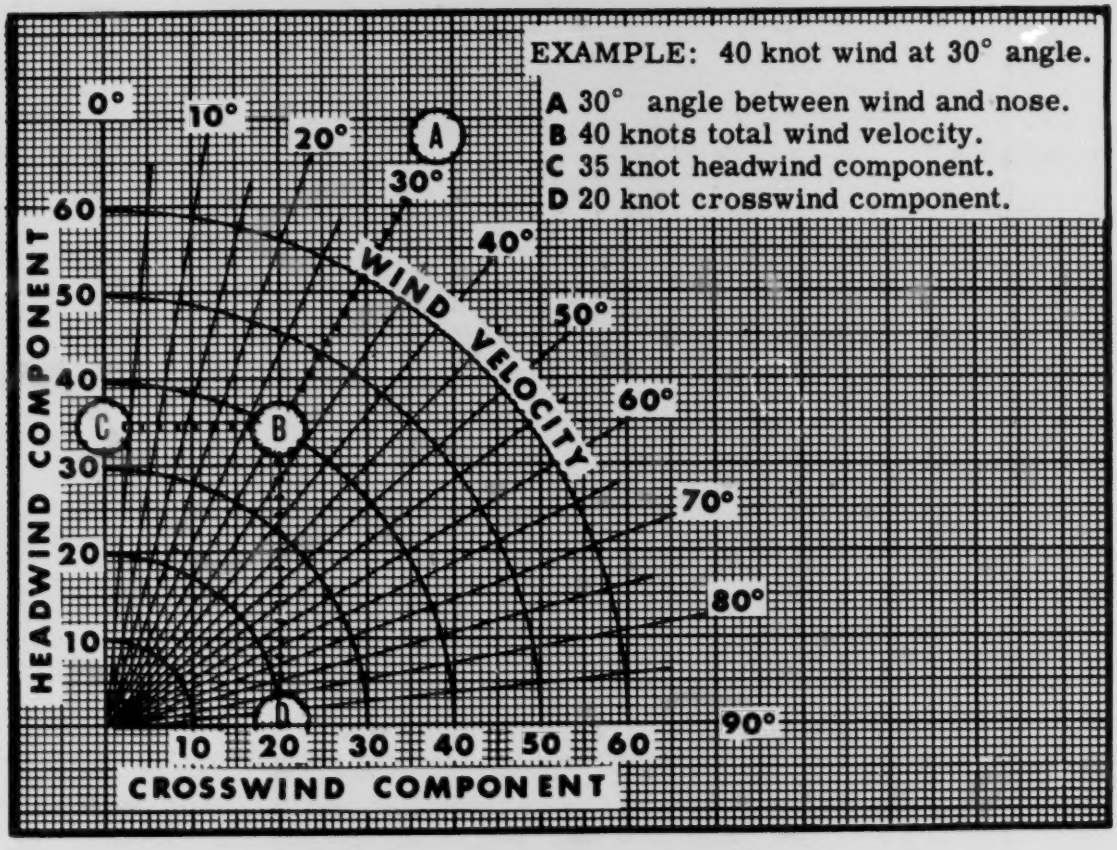

FIGURE 17. Crosswind performance chart.

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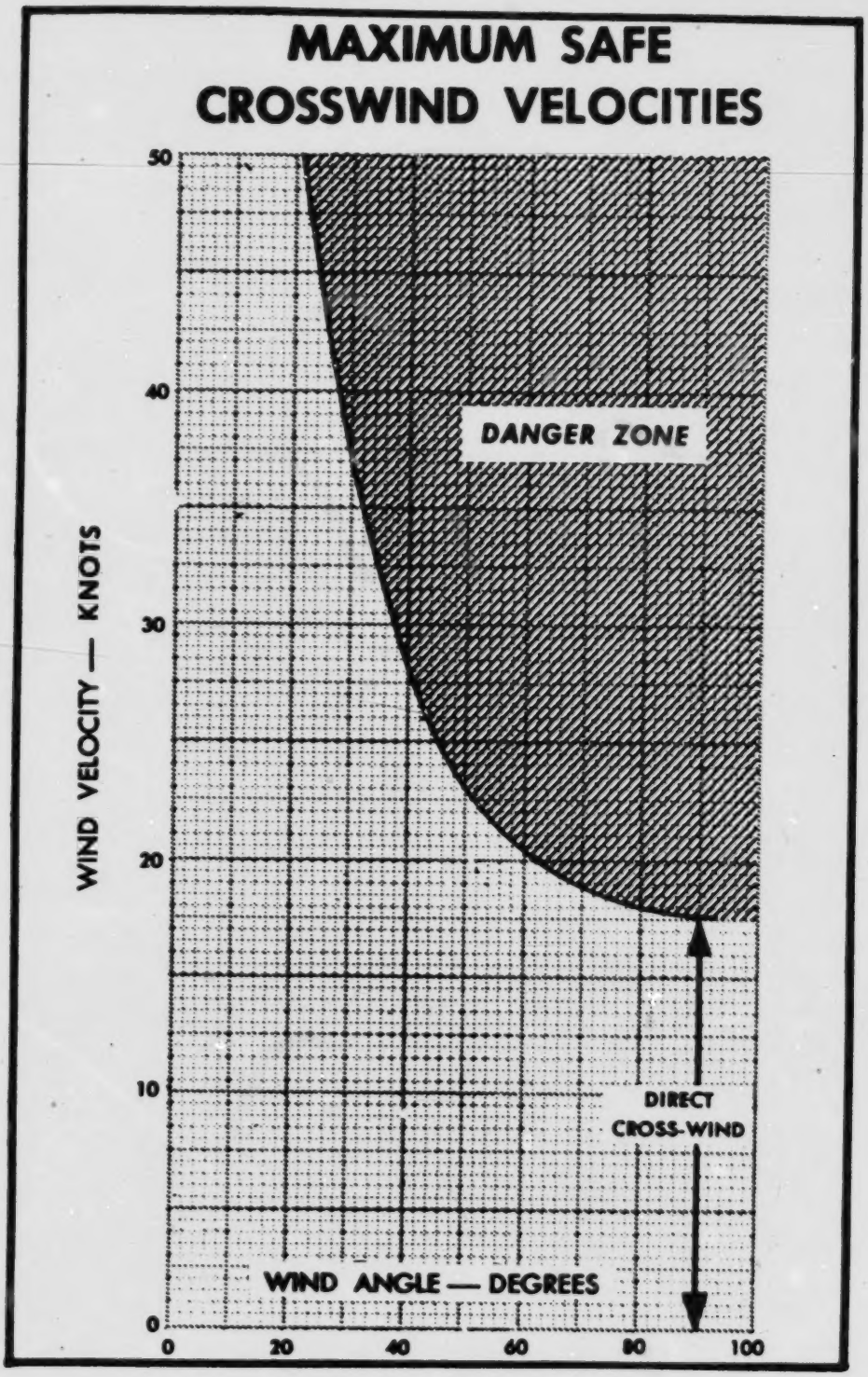

FIGURE 18. Crosswind performance chart.

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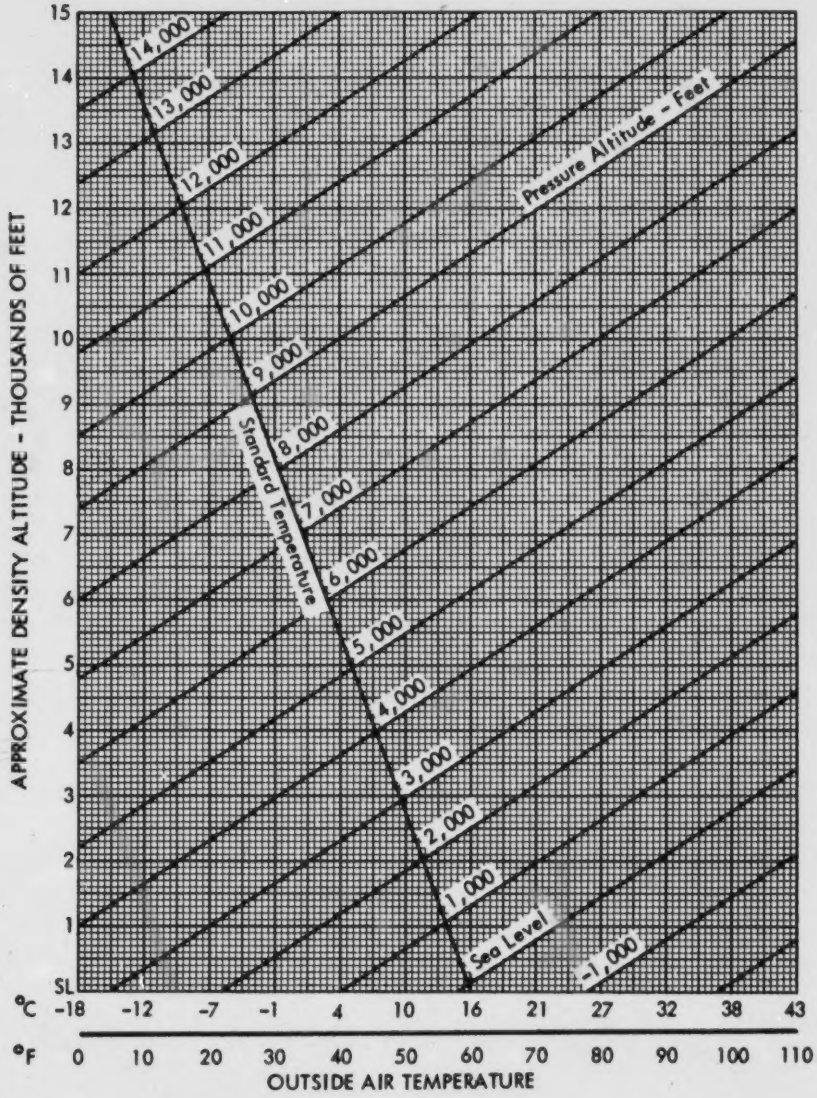
Set Altimeter to 29.92 In. Hg.
When Reading Pressure Altitude



Altitude Setting in Hg.	Altitude Correction
28.0	1,825
28.1	1,725
28.2	1,630
28.3	1,535
28.4	1,435
28.5	1,340
28.6	1,245
28.7	1,150
28.8	1,050
28.9	955
29.0	865
29.1	770
29.2	675
29.3	580
29.4	485
29.5	390
29.6	300
29.7	205
29.8	110
29.9	20
29.92	0
30.0	-75
30.1	-165
30.2	-225
30.3	-350
30.4	-440
30.5	-530
30.6	-620
30.7	-710
30.8	-805
30.9	-895
31.0	-965

FIGURE 19. Density altitude chart.

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AIRCRAFT DESIGNATION:- Condor 410.
ENGINE OPERATION LIMITATIONS:- 260 HP at 2625 RPM.
FUEL SYSTEM:- Fuel injection System (Fuel discharged into combustion chamber)
Recommended Fuel 100/130 Minimum Grade.
Fuel Capacity Standard Tanks 65 gallons.
Usable Fuel All Flight Conditions 63.5 gallons.
OIL CAPACITY:- Total 12 quarts. (moment -0.4)
PROPELLER:- Constant-speed Hydraulically Controlled.
LANDING GEAR:- Retractable Tricycle Landing Gear.
Hydraulic Actuators Powered By Engine Driven Hydraulic Pump.
Emergency Operation:- Manual Hydraulic Pump.
WING FLAPS:- Hydraulically Operated; Powered By Engine Driven Hydraulic Pump.
EMPTY WEIGHT:- 1840 lbs. (moment 63.7)
MAXIMUM GROSS WEIGHT:- 3000 lbs.
LOAD FACTOR:-
Flaps Up + 3.8, -1.52
Flaps Dn. +3.5

RADIO EQUIPMENT:-

1 VHF Communications Transceiver	118.0 to 135.95 MHz
1 VHF Localizer/VOR Receiver	108.0 to 117.9 MHz
1 ADF Receiver (fixed azimuth)	200 kHz to 1750 kHz

AIRSPEED LIMITATIONS:-

Never exceed speed	225 mph CAS
Maximum structural cruising speed	190 mph CAS
Maximum maneuvering speed	132 mph CAS
Maximum gear operating speed	160 mph CAS
Maximum gear extended speed	160 mph CAS
Maximum flap extended speed	
Flaps 10°	160 mph CAS
Flaps 10° - 40°	110 mph CAS

MAXIMUM ALLOWABLE WEIGHT IN BAGGAGE COMPARTMENT - 120 LBS.

FIGURE 20. Owner's manual excerpts.

40

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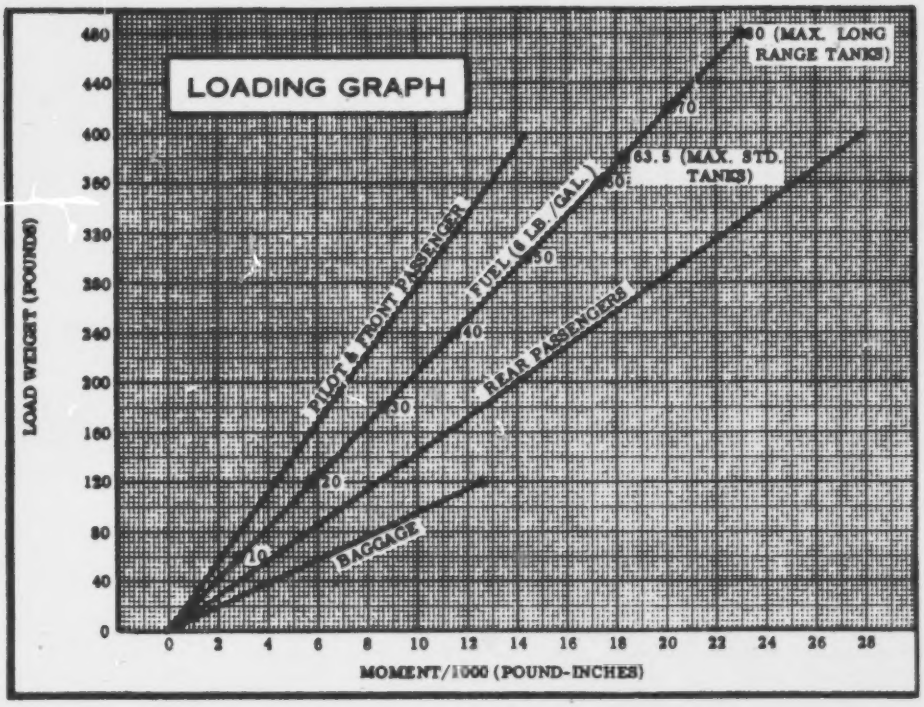

FIGURE 21. Loading graph.

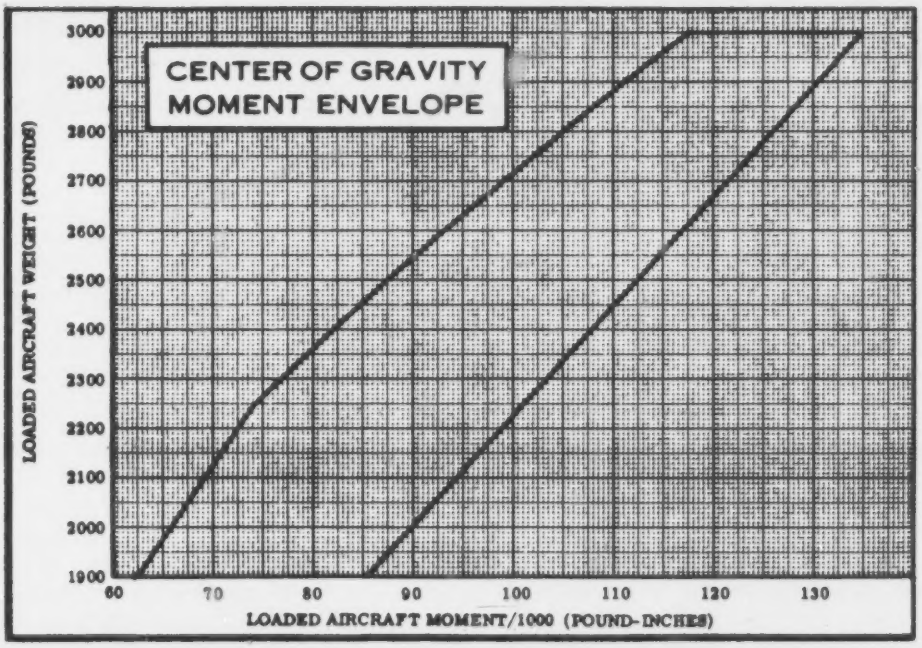

FIGURE 22. Center of gravity envelope.

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TAKE-OFF DATA

TAKE-OFF DISTANCE WITH 20° FLAPS FROM HARD-SURFACED RUNWAY

GROSS WEIGHT LBS.	IAS AT 50 FT. MPH	HEAD WIND MPH	AT SEA LEVEL & 59°F		AT 2500 FEET & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 32 F	
			GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE
2200	55	0	345	680	405	770	480	885	580	1040
		15	205	460	245	525	295	615	365	725
		30	100	275	130	320	155	380	195	460
2600	60	0	500	915	585	1045	705	1230	855	1470
		15	310	635	370	735	455	870	560	1055
		30	165	395	200	465	255	585	325	695
3000	64	0	695	1210	820	1405	990	1675	1205	2045
		15	450	855	535	1005	660	1215	815	1505
		30	250	555	310	665	390	820	500	1030

NOTE: INCREASE DISTANCES 10% FOR EACH 25°F ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

FIGURE 23. Takeoff data.

CLIMB DATA

GROSS WEIGHT LBS	AT SEA LEVEL & 59°F			AT 5000 FT. & 41°F			AT 10000 FT. & 23°F			AT 15000 FT. & 5°F			AT 20000 FT. & -12 F		
	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED
2200	96	1900	3.0	92	1530	2.9	89	1150	3.9	83	780	5.1	78	410	6.8
2600	100	1540	3.0	97	1310	3.1	93	890	4.4	88	580	6.1	84	250	8.6
3000	105	1270	3.0	101	980	3.4	97	690	5.0	94	400	7.3	90	120	11.5

NOTE: FULL THROTTLE, 2625 RPM, MIXTURE AT RECOMMENDED LEANING SCHEDULE, FLAPS AND GEAR UP. FUEL USED INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE.

FIGURE 24. Climb data.

LANDING DISTANCE TABLE

GROSS WEIGHT LBS.	APPROACH IAS MPH	AT SEA LEVEL & 59°F		AT 2500 FT & 50°F		AT 5000 FT & 41°F		AT 7500 FT & 32°F	
		GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE
2200	61	355	945	385	980	415	1020	445	1060
2600	66	430	1030	455	1070	490	1110	530	1155
3000	71	485	1110	525	1150	565	1200	610	1255

NOTE: REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND. FLAPS 40° AND POWER OFF.

FIGURE 25. Landing distance table.

2500 CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight - 3000 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	24	76	180	14.3	4.4	800	5.6	1010
	23	71	177	13.4	4.7	835	6.0	1050
	22	67	173	12.7	5.0	865	6.3	1090
	21	63	169	11.9	5.3	900	6.7	1135
2300	24	68	174	12.8	4.9	860	6.2	1085
	23	64	170	12.1	5.2	890	6.6	1120
	22	61	166	11.4	5.6	925	7.0	1165
	21	57	163	10.8	5.9	960	7.4	1210
2200	23	60	166	11.3	5.6	930	7.1	1175
	22	56	162	10.7	6.0	965	7.5	1215
	21	53	158	10.0	6.3	1005	8.0	1265
	20	49	154	9.4	6.7	1035	8.5	1305
2100	22	52	157	9.9	6.4	1010	8.1	1275
	21	48	153	9.3	6.8	1045	8.6	1320
	20	45	148	8.7	7.3	1080	9.2	1360
	19	42	144	8.3	7.7	1105	9.7	1390
	18	39	139	7.8	8.1	1130	10.2	1420
	17	35	133	7.3	8.7	1150	10.9	1445
	16	32	126	6.9	9.2	1160	11.6	1460

CRUISE PERFORMANCE 5000

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight - 3000 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	24	79	187	14.8	4.3	800	5.4	1010
	23	74	183	14.0	4.5	830	5.7	1050
	22	70	179	13.1	4.8	870	6.1	1095
	21	65	175	12.3	5.2	905	6.5	1140
2300	24	71	180	13.3	4.8	860	6.0	1080
	23	67	177	12.6	5.0	890	6.4	1125
	22	63	173	11.8	5.4	925	6.8	1170
	21	59	169	11.1	5.7	965	7.2	1215
2200	23	62	172	11.7	5.4	935	6.8	1175
	22	58	168	11.0	5.8	970	7.2	1220
	21	55	165	10.4	6.1	1005	7.7	1265
	20	51	160	9.8	6.5	1040	8.2	1310
2100	22	53	163	10.1	6.3	1020	7.9	1290
	21	50	159	9.6	6.6	1055	8.4	1330
	20	46	154	9.0	7.1	1090	8.9	1370
	19	43	150	8.5	7.5	1115	9.4	1405
	18	40	145	8.1	7.9	1140	9.9	1435
	17	37	139	7.6	8.4	1160	10.6	1465
	16	34	132	7.1	8.9	1175	11.2	1480
	15	31	125	6.7	9.4	1180	11.9	1485

FIGURE 26. Cruise performance data.

7500 CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight-3000 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	22	72	186	13.6	4.7	870	5.9	1095
	21	67	182	12.7	5.0	910	6.3	1145
	20	64	178	12.0	5.3	945	6.7	1190
	19	59	173	11.1	5.7	990	7.2	1245
2300	22	65	179	12.2	5.2	930	6.6	1175
	21	61	175	11.5	5.5	970	7.0	1220
	20	57	171	10.8	5.9	1005	7.4	1270
	19	53	167	10.1	6.3	1040	7.9	1320
2200	22	61	175	11.4	5.6	970	7.0	1225
	21	57	171	10.7	5.9	1010	7.5	1275
	20	53	166	10.1	6.3	1045	7.9	1315
	19	50	162	9.5	6.7	1080	8.4	1360
2100	21	52	165	9.8	6.4	1060	8.1	1335
	20	48	160	9.3	6.8	1095	8.6	1380
	19	45	155	8.7	7.3	1125	9.2	1420
	18	42	150	8.3	7.7	1150	9.7	1450
	17	39	145	7.8	8.1	1175	10.2	1485
	16	35	138	7.4	8.6	1190	10.9	1500
	15	32	131	6.9	9.1	1200	11.5	1510

CRUISE PERFORMANCE 10,000

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight-3000 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	20	65	184	12.3	5.2	950	6.5	1200
	19	61	179	11.5	5.5	995	7.0	1250
	18	57	174	10.7	5.9	1035	7.5	1305
	17	52	169	10.0	6.4	1075	8.0	1355
2300	20	59	177	11.1	5.7	1010	7.2	1275
	19	55	173	10.4	6.1	1050	7.7	1325
	18	51	168	9.8	6.5	1090	8.2	1370
	17	48	162	9.1	6.9	1125	8.7	1420
2200	20	55	173	10.4	6.1	1050	7.7	1325
	19	52	168	9.9	6.4	1085	8.1	1365
	18	48	163	9.2	6.9	1120	8.7	1410
	17	44	158	8.7	7.3	1155	9.2	1450
2100	20	50	166	9.5	6.7	1105	8.4	1390
	19	47	161	9.0	7.0	1135	8.9	1430
	18	44	156	8.5	7.4	1160	9.4	1465
	17	40	150	8.0	7.9	1185	9.9	1495
	16	37	144	7.6	8.4	1205	10.5	1520
	15	34	137	7.1	8.9	1215	11.2	1530
	14	30	126	6.6	9.6	1200	12.0	1510

FIGURE 27. Cruise performance data.

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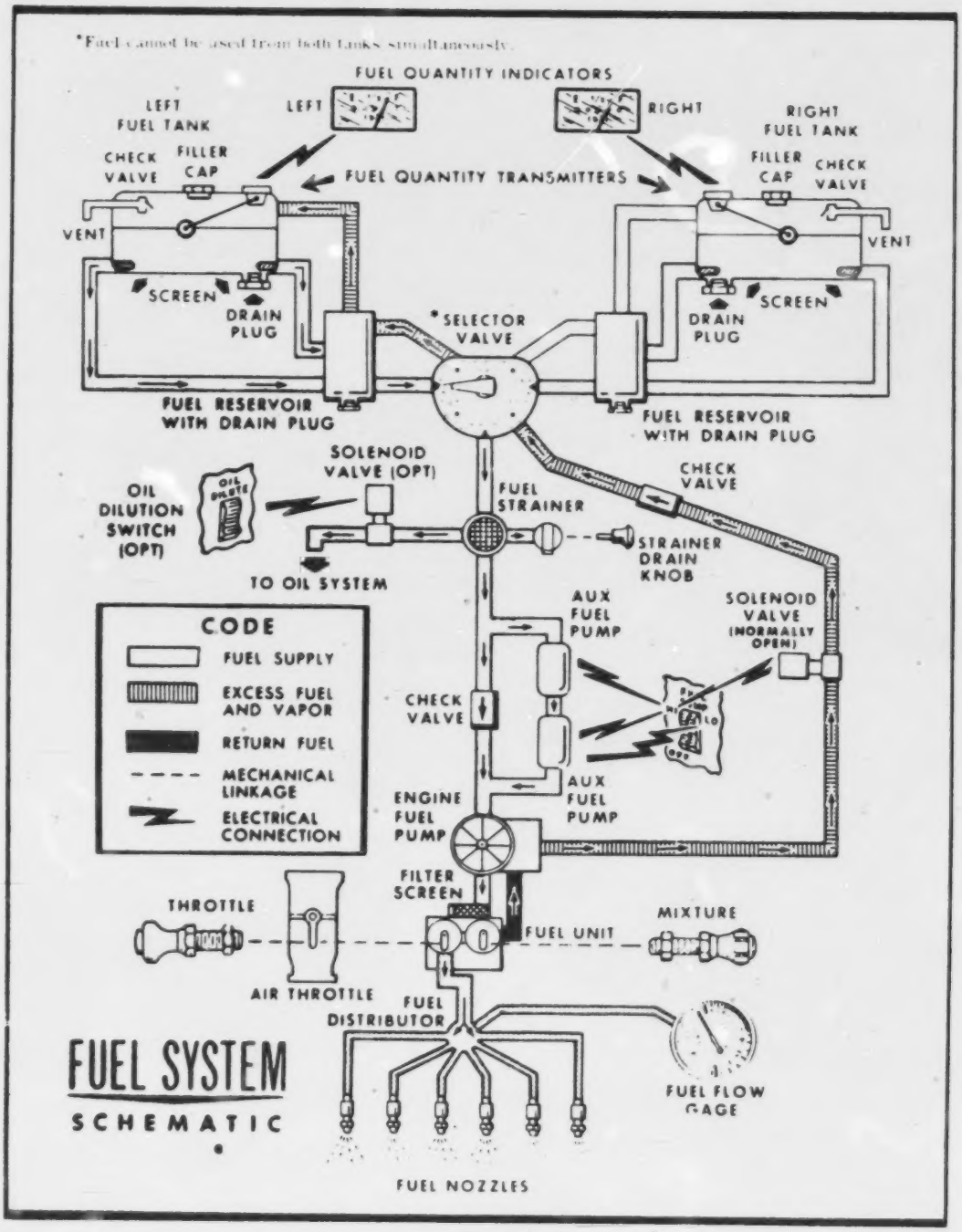

FIGURE 28. Fuel system schematic.

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AIRCRAFT DESIGNATION:- Bobwhite 45H.
ENGINE OPERATION LIMITATIONS:- 240 HP at 2600 RPM.
FUEL SYSTEM:- Pressure Type Carburetor (Fuel discharged into induction system)
Recommended Fuel 91/96 Minimum Grade.
Fuel Capacity Standard Tanks 60 gallons.
Usable Fuel All Flight Conditions 55 gallons.
OIL CAPACITY:- Total 12 quarts.
PROPELLER:- Constant-speed Hydraulically Controlled.
LANDING GEAR:- Retractable Tricycle Landing Gear.
Electrically Operated.
Emergency Operation - Manual Handcrank to Lower Gear ONLY.
WING FLAPS:- Electrically Operated.
EMPTY WEIGHT:- 1,839 lbs. (moment 65.9)
MAXIMUM GROSS WEIGHT:- 2,900 lbs.
LOAD FACTOR:-
Flaps Up +4.4, -1.7
Flaps Dn + 1.5

RADIO EQUIPMENT:-

1 VHF Communications Transceiver	118.0 to 135.95 MHz
1 VHF Localizer/VOR Receiver	108.0 to 117.9 MHz
1 ADF Receiver (fixed azimuth)	200 kHz to 1750 kHz

AIRSPEED LIMITATIONS:-

Never exceed speed	210 mph CAS
Maximum structural cruising speed	175 mph CAS
Maximum maneuvering speed	142 mph CAS
Maximum gear extended speed	140 mph CAS
Maximum flaps extended speed	120 mph CAS

MAXIMUM ALLOWABLE WEIGHT IN BAGGAGE COMPARTMENT - 120 LBS.

FIGURE 29. Owner's Manual excerpts.

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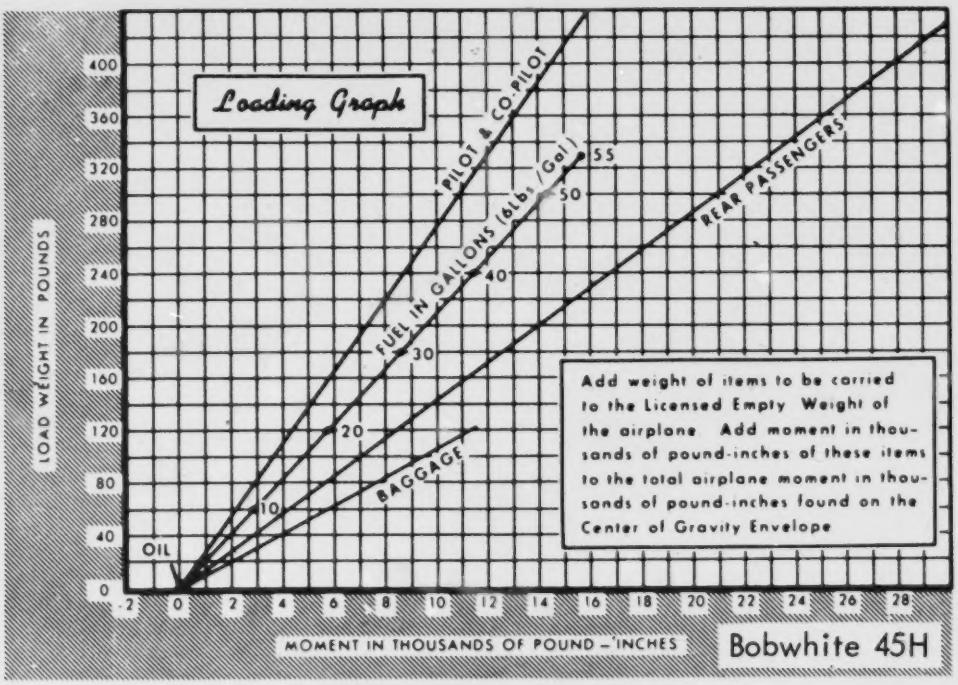

FIGURE 30. Loading graph.

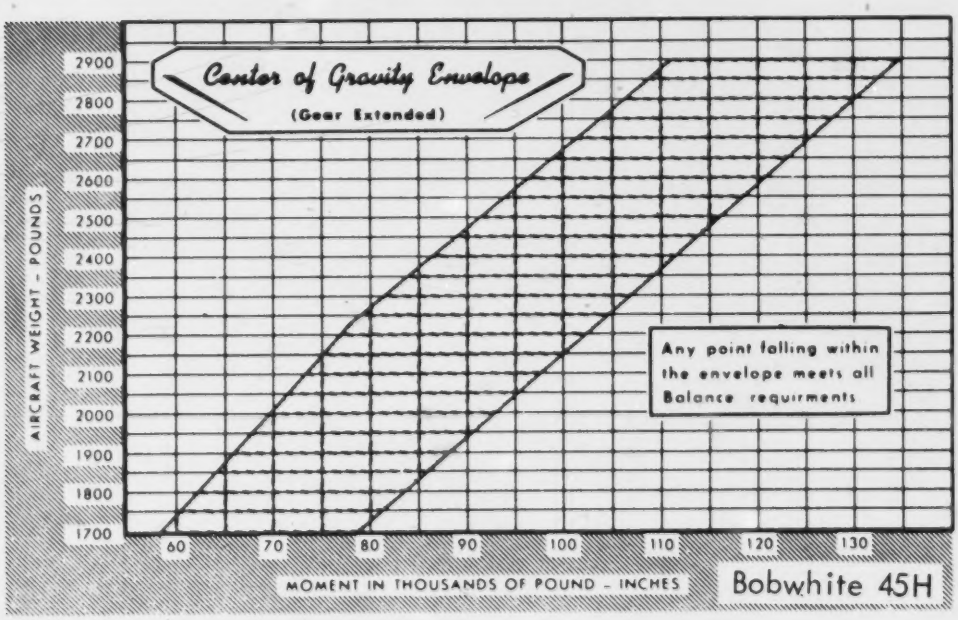

FIGURE 31. Center of gravity envelope.

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Bobwhite 45H

NORMAL TAKE-OFF

TO CLEAR 50 FEET
ZERO WIND — GROSS WT. = 2900 LB.
PAVED LEVEL RUNWAY

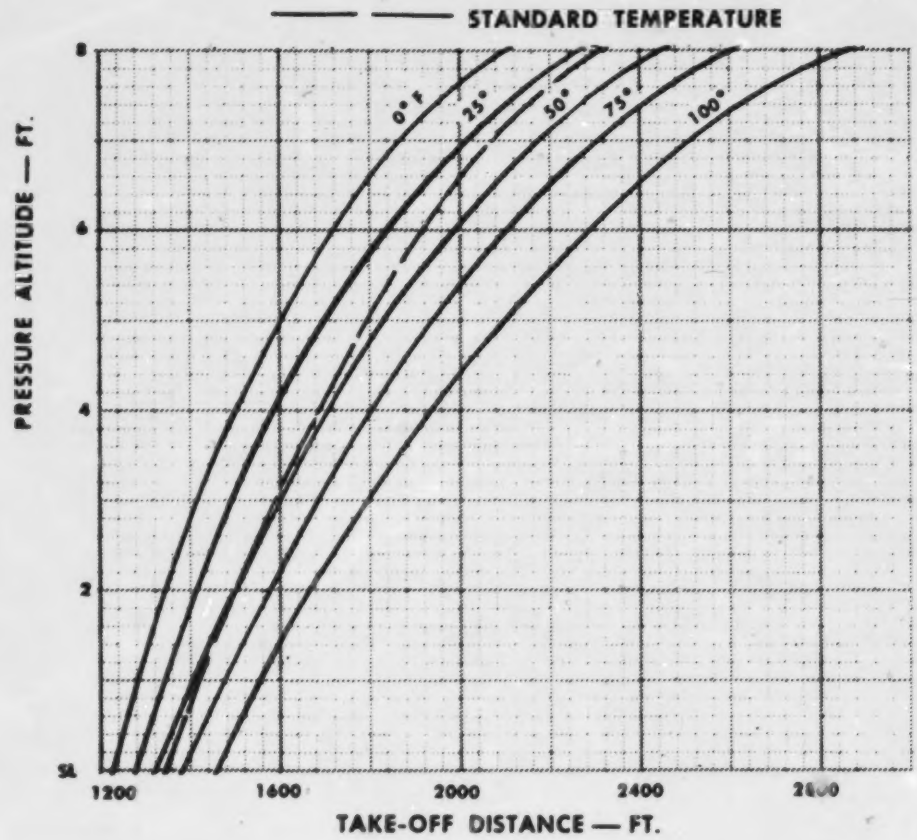

FIGURE 32. Takeoff performance.

48

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Bobwhite 45H

NORMAL LANDING

LANDING DISTANCE OVER 50 FT.
POWER OFF APPROACH
FLAPS — 30°, ZERO WIND
GROSS WEIGHT = 2900 LB.
PAVED LEVEL RUNWAY

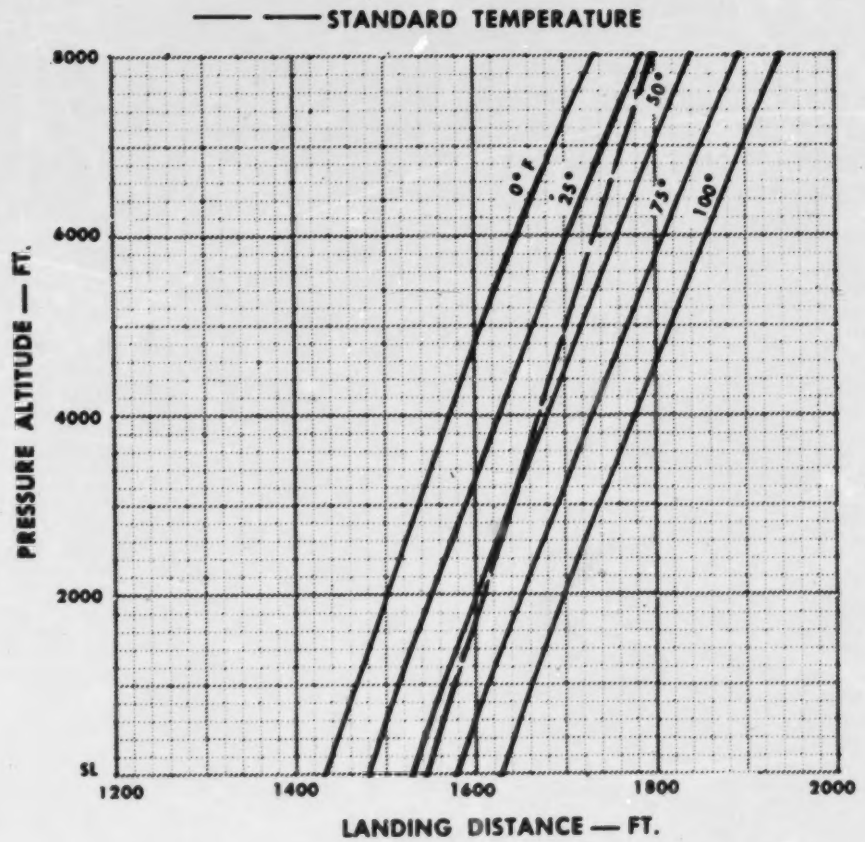

FIGURE 33. Landing performance.

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Bobwhite 45H

INSTRUCTIONS
FOR USE OF CRUISE PERFORMANCE DATA

NOTE: NO ALLOWANCES WERE MADE IN THE GRAPHS FOR RESERVES, NOR FOR VARIABLE FACTORS SUCH AS WINDS AND FUEL CONSUMED IN THE WARM-UP AND TAXIING; YOU MUST MAKE ALLOWANCES FOR THESE CONDITIONS AS THEY ACTUALLY EXIST, FROM ONE FLIGHT TO ANOTHER.

HORSEPOWER

TO DETERMINE THE HORSEPOWER BEING DEVELOPED, APPLY THE RPM AND MANIFOLD PRESSURE SETTINGS TO BE USED TO THE CRUISING HORSEPOWER CHART. NOTE THAT THE MANIFOLD PRESSURE REQUIRED TO OBTAIN A GIVEN HORSEPOWER WILL VARY WITH THE OUTSIDE AIR TEMPERATURE.

FUEL CONSUMPTION

TO DETERMINE THE RATE OF FUEL CONSUMPTION, APPLY THE HORSEPOWER BEING USED AND THE CRUISING ALTITUDE TO THE FUEL CONSUMPTION VS. HORSEPOWER CHART.

CRUISING AIRSPEED

TO DETERMINE THE CRUISING AIRSPEED THAT RESULTS FROM THE HORSEPOWER BEING USED, APPLY THE HORSEPOWER AND THE CRUISING ALTITUDE TO THE CRUISING OPERATION CHART.

DENSITY ALTITUDE

EXCEPT WHEN CONTRARY TO THE PROBLEM POSED IN SPECIFIC TEST ITEMS, CONSIDER INDICATED ALTITUDE, PRESSURE ALTITUDE, AND DENSITY ALTITUDE AS BEING IDENTICAL IN DETERMINING CRUISE CONTROL DATA FOR THE AIRPLANE.

FIGURE 34. Cruise performance instructions.

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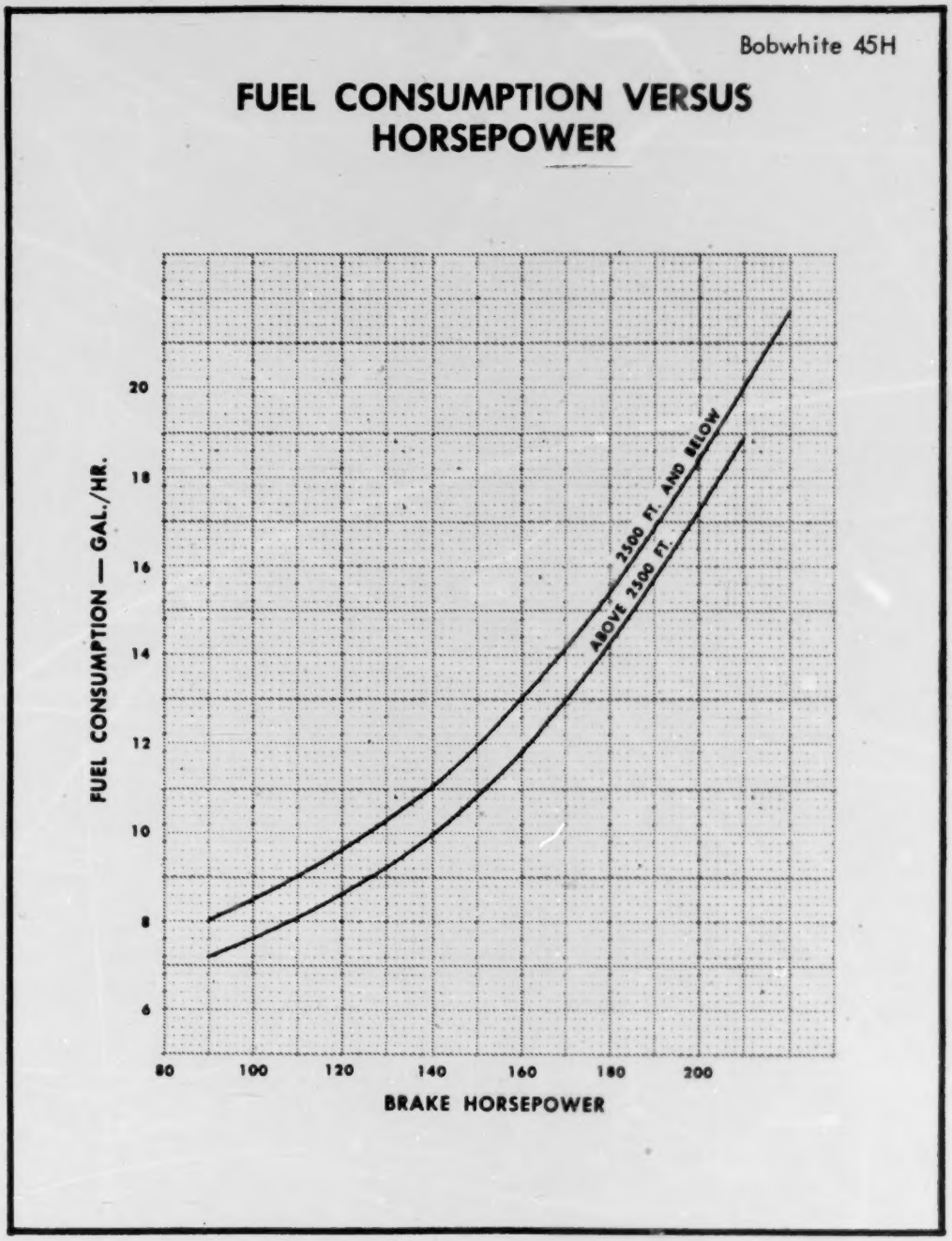

FIGURE 35. Fuel consumption.

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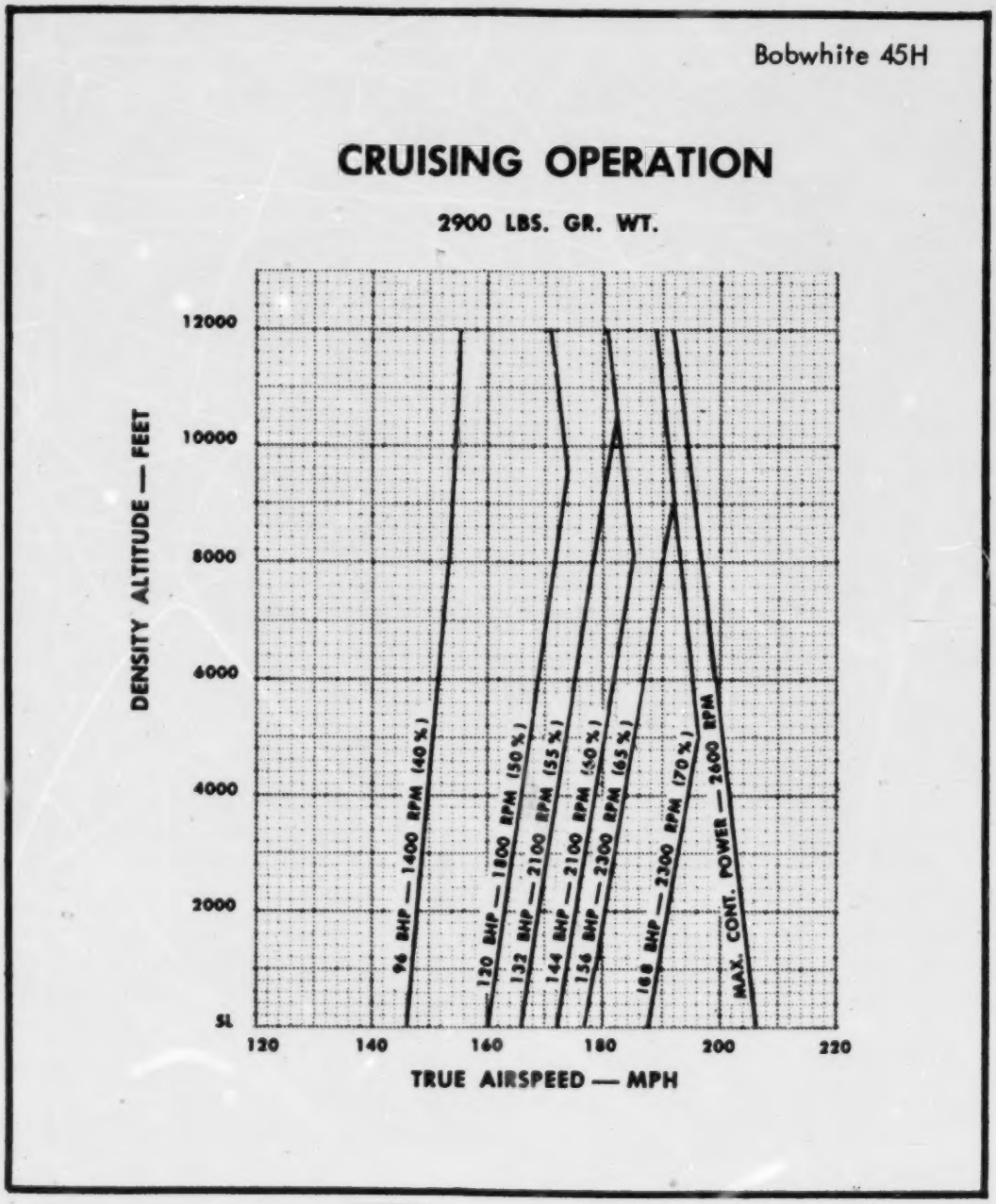

FIGURE 36. Cruising operations.

CRUISING POWER SETTINGS

Bobwhite 45H

SEA LEVEL

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
21.4	23.6	26.5
20.2	22.3	24.8
19.1	21.0	23.3
17.9	19.8	21.8
21.7	24.0	26.9
20.5	22.7	25.2
19.5	21.4	23.7
18.3	19.9	22.2
23.0	24.4	27.3
20.8	23.0	25.6
19.8	21.7	24.1
18.5	20.3	22.5
22.3	24.7	27.7
21.1	23.3	26.0
20.0	22.0	24.5
18.7	20.5	22.8
22.5	24.9	27.9
21.3	23.5	26.1
20.1	22.1	24.6
18.8	20.8	22.9
22.6	25.1	28.1
21.3	23.6	26.3
20.2	22.2	24.8
18.9	20.7	23.0
22.8	25.2	28.3
21.4	23.7	26.5
20.3	22.3	24.9
18.9	20.8	23.0
22.9	25.4	28.5
21.5	23.8	26.6
20.3	22.3	25.1
19.0	20.9	23.1

PRESSURE ALTITUDE

OAT °F	BHP
0	156
	144
	132
	120
20	156
	144
	132
	120
40	156
	144
	132
	120
60	156
	144
	132
	120
80	156
	144
	132
	120
100	156
	144
	132
	120

2000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
21.3	23.6	26.3
20.0	22.0	24.5
18.7	20.6	22.8
17.6	19.3	21.5
21.6	24.0	26.7
20.3	22.4	24.9
19.1	21.0	23.2
17.9	19.6	21.9
21.9	24.3	27.1
20.6	22.7	25.3
19.4	21.3	23.6
18.2	19.9	22.2
22.0	24.5	27.3
20.7	22.9	25.5
19.5	21.4	23.8
18.3	20.0	22.1
22.2	24.6	27.5
20.9	23.0	25.7
19.6	21.6	24.0
18.4	20.2	22.5
22.3	24.8	
21.0	23.2	25.8
19.7	21.7	24.1
18.5	20.3	22.6
22.5	25.0	
21.1	23.3	26.0
19.8	21.8	24.3
18.6	20.4	22.7
22.6	25.2	
21.2	23.4	26.2
19.9	21.9	24.4
18.6	20.5	22.7

4000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
21.0	23.3	
19.8	21.8	24.3
18.4	20.3	22.5
17.4	19.1	21.2
21.3	23.7	
20.1	22.2	24.7
18.8	20.5	22.9
17.7	19.4	21.6
21.6	24.0	
20.4	22.5	25.2
19.1	21.0	23.3
18.0	19.7	21.9
21.7	24.1	
20.5	22.6	25.3
19.1	21.1	23.5
18.1	19.9	22.1
21.9	24.3	
20.7	22.8	25.5
19.3	21.3	23.7
18.2	20.0	22.3
22.0	24.5	
20.8	23.0	
19.4	21.4	23.8
18.3	20.1	22.3
22.2	24.7	
20.9	23.1	
19.5	21.5	24.0
18.4	20.2	22.4
22.3	24.9	
21.0	23.2	
19.6	21.6	24.1
18.4	20.3	22.4

6000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
20.9	23.0	
19.6	21.6	
18.3	20.2	22.4
17.2	18.9	21.0
21.2	23.4	
19.9	22.0	
18.7	20.6	22.8
17.5	19.2	21.4
21.4	23.5	
20.1	22.1	
18.8	20.7	23.0
17.7	19.4	21.6
21.5	23.7	
20.2	22.3	
19.0	20.9	23.2
17.8	19.5	21.7
21.8	23.9	
20.4	22.5	
19.1	21.0	23.4
17.9	19.6	21.9
21.8		
20.5	22.6	
19.2	21.2	23.6
18.0	19.8	22.0
21.9		
20.6	22.8	
19.3	21.3	23.7
18.1	19.9	22.1
22.1		
20.7	22.9	
19.4	21.4	23.9
18.2	20.0	22.2

PRESSURE ALTITUDE

OAT °F	BHP
0	156
	144
	132
	120
20	156
	144
	132
	120
40	156
	144
	132
	120
60	156
	144
	132
	120
80	156
	144
	132
	120

8000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
20.7		
19.4	21.5	
18.1	19.9	
16.9	18.7	20.7
21.0		
19.7	21.9	
18.5	20.3	
17.2	19.0	21.1
21.2		
19.9	22.0	
18.6	20.4	
17.4	19.2	21.3
21.3		
20.0		
18.8	20.6	
17.5	19.3	21.4
21.4		
20.1		
18.9	20.7	
17.6	19.4	21.6
21.6		
20.3		
19.0	20.9	
17.7	19.6	21.7
21.7		
20.4		
19.1	21.0	
17.8	19.7	21.8
21.9		
20.5		
19.2	21.1	
17.9	19.8	21.9

10000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
20.5		
19.1		
17.7	19.5	
16.6	18.3	20.3
19.3		
17.9	19.7	
16.8	18.4	20.4
19.6		
18.1	19.9	
16.9	18.6	20.6
19.8		
18.4	20.2	
17.3	18.9	
19.9		
18.6	20.4	
17.4	19.0	
20.0		
18.7		
17.5	19.1	
20.2		
18.8		
17.6	19.3	

12000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
18.9		
17.6		
16.4	18.0	
19.1		
17.8		
16.6	18.2	
18.0		
16.7	18.4	
18.2		
16.9	18.5	
18.3		
17.1	18.7	
18.5		
17.2	18.8	
18.6		
17.3	18.9	
18.7		
17.4	19.1	

PRESSURE ALTITUDE

OAT °F	BHP
−10	156
	144
	132
	120
0	156
	144
	132
	120
10	156
	144
	132
	120
20	156
	144
	132
	120
30	156
	144
	132
	120
40	156
	144
	132
	120
50	156
	144
	132
	120
60	156
	144
	132
	120

10000 FEET

MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
20.5		
19.1		
17.7	19.5	
16.6	18.3	20.3
19.3		
17.9	19.7	
16.8	18.4	20.4
19.6		
18.1	19.9	
16.9	18.6	20.6
19.8		
18.4	20.2	
17.3	18.9	
19.9		
18.6	20.4	
17.4	19.0	
20.0		
18.7		
17.5	19.1	
20.2		
18.8		
17.6	19.3	

75 PERCENT POWER — 180 BHP — 2300 RPM

OAT	SEA LEVEL AT 2300 RPM	2000 FEET AT 2300 RPM	4000 FEET AT 2300 RPM
0	23.7	23.6	23.4
20	24.0	23.9	23.8
40	24.4	24.3	24.2
60	24.8	24.7	24.6
80	25.2	25.2	25.0
100	25.7	25.7	25.4

FIGURE 37. Power settings.

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```
     SA21 031900
MLC SP B11030+3RW--F 062/62/59/0605/973/TE47 MOVD NE NO GSTS CIG RGD
ADM M3+1TRW-F 63/52/1415/966/TB22 S MOVG N PK WND 12/18 22
DAL M10-15+5RW-F 70/67/1710G19/963 PRESFR
FTW M17-100-300-7 67/63/2713G28/966/RE25 WND SHFTD GRDLY→FTW↘9/22 10/6
10/9 11/26
GSW 5-E20-70+12TRW- 038/63/63/2511/966/ TB15 N-E-S MOVG NE OCNL
LTGICCG PK WND 24/30 33 BINOVC PRES UNSTDY RE03B19
ACT 25-E40-12 048/68/58/2614/968/ TE24 N MOVD NE TCU NE-SE
PK WND 23/26 15 RE15 WND 220V300
CLL E15+7 060/74/71/1810/971/RB45RE55 PRESFRF/→CLL↘11/20
TPL E25+10 63/55/3015/969
LFK SP E5+7 072/72/67/1210/975


   SA NEAR WEST 031902
SPS E70-250+10 051/60/>0/2618/970→SPS↘11/2
HBR SP 15-25-250-12 029/55/53/2>14/964
GAG S A5+12R- 072/35/33/0322/974/PK WND 01/22 55/UA 1825 GAG-OKC
28+35 E65+ ABV TOPS UNKN
CDS 5-250-12 049/55/38/3212G20/969→CDS↘11/11
MAF 45-250-20+ 075/53/20/2818/983→MAF ↘9/3 12/3
LBB 17-E200+15 046/51/33/3513/973→LBB↘11/22
AMA SP M6-10+5L--S--F 059/36/34/0117G27/973
DDC SP M5+3ZRW-F 104/32/27/E021>G25/983
GCK SP A8->0+>ZL-F 108/33/30/0215/984/LEZLB4> -V+→GCK↘11/7
DHT W2X3/16S--BSF 082/31/31/3520G30/978→DHT↘12/1
TCC W0X1/4SF 115/32/31/3615G25/987
HOB E40-250-25 43/18/3120G30/982 TCU NW-N


ADM SP 2008 30-M37+10TRW-- 2614/964/T NE MOVG NE RW+ NE
```

FIGURE 38. Aviation weather reports.

```
→NOSUM 031928
 E→FTW 9/22 DFW ARPT CLSD
E→FTW 10/6 DFW GP 17L-35R OTS
E→FTW 10/9 9-27 CLSD
E→FTW 11/26 F54 16-34 CLSD TIL 12/26
E→CLL 11/20 ILS BC 16 OTS

→NOSUM NEAR WEST 031928
E→SPS 11/2 LAW 1ST 1000 35 CLSD
E→CDS 11/11 RWY LGTS PPO
→MAF 9/3 E02 16-34 CLSD
→MAF 12/3 LOC OTS 19-2100
E→LBB 11/22 THR 8 DSPLCD 550
E→GCK 11/7 LBL THR 21 DSPLCD 1280
→DHT 12/1 GUY NDB OTS
```

FIGURE 39. NOTAM summaries.

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```
FT 031040
DAL 031111 C10⊕ 1614G. 17Z C18⊕ 1818G30 SLGT CHC C10⊕2TRW. 19Z
    C30⊕ 1818G32 OCNL C10⊕2TRW CHC C5X1/2T+RW+A 3335G60. 00Z CFP
    C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..
GSW 031111 C10⊕ 1614G. 17Z C18⊕ 1818G30 SLGT CHC C10⊕2TRW. 19Z
    C30⊕ 1818G32 OCNL C10⊕2TRW CHC C5X1/2T+RW+A 3335G60. 00Z CFP
    C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..
ACT 031111 C10⊕7 1415G VRBL C6⊕3F. 17Z C18⊕ 1716G SLGT CHC C10⊕2TRW.
    19Z C25⊕ 1816G CHC C6X1TRW+ 3330G45. 01Z CFP C25⊕ 3315G CHC
    C12⊕2TRW. 05Z MVFR..
CLL 031111 C6⊕3F 1612 OCNL C3X1/2F. 16Z C12⊕ 1614G. 18Z C30⊕ 1814G.
    21Z 35⊕C100⊕ 1814G OCNL C10⊕2TRW+. 05Z MVFR..
LFK 031111C6⊕4F VRBL C3X1/2F. 16Z C12⊕ 1514. 18Z C25⊕ 1814G OCNL
    C10⊕1TRW+ 3225G45. 05Z MVFR..
TYR 031111 C6⊕ 1512 OCNL C4⊕2F. 16Z C12⊕5F 1714. 18Z C25⊕ 1814G
    CHC C8X1TRW+ 3330G50. 05Z MVFR..
GGG 031111 C6⊕ 1110 OCNL C4⊕2F. 16Z C12⊕5F 1714. 18Z C25⊕ 1814G
    CHC C8X1TRW+ 3330G50. 05Z MVFR..
MLC 031111 C20⊕ 1812G22 CHC C10⊕1TRW. 02Z CFP C15⊕ 3613 CHC C7⊕2R-F.
 05Z IFR..
ADM 031111 C20⊕ 1812G23 CHC C10⊕1TRW. 00Z CFP C15⊕ 3614 CHC C7⊕2R-F.
 05Z IFR..

   FT NEAR WEST 031043
SPS 031111 C15⊕ 1718G. 15Z C25⊕ 1818G32 OCNL C10⊕1TRW+ CHC C5X1/2
    T+RW+A 3435G60. 19Z CFP C18⊕ 3416G CHC C10⊕2TRW. 23Z C25⊕ 3515G
    CHC C15⊕3RW-. 05Z MVFR..
GAG 031111 C40⊕ 1713G23. 13Z CFP C15⊕ 3615G25 CHC C7⊕2R-F. 05Z IFR..
MAF 031111 250⊕ 3012. 18Z 100⊕250-⊕ 3218G30. 01Z 250-⊕ 3315.
 05Z VFR..
LBB 031111 C40⊕ 3214 ⊕V⊕ CHC RW-. 16Z C30⊕ 3315G30 CHC RW-.
 21Z 150⊕C25⊕ 3618 CHC RW-. 03Z C15⊕ 0218 CHC C10⊕3R-S-. 05Z IFR..
AMA 031111 C40⊕ 3415 CHC RW-. 16Z C25⊕ 3615G30 CHC RW-. 21Z C15⊕
 0118 OCNL C10⊕3R-S-. 03Z C10⊕5S- 0318 OCNL C5X1/2S-F. 05Z IFR..
DDC 031111 C10⊕ 3618G28 CHC C5⊕2R- OR S-. 17Z C50⊕ 3615G25 BRF SW-.
 00Z C50⊕ 3615 ⊕V⊕.
GCK 031111 C12⊕ 3618G28 CHC C5⊕2S-. 17Z C50⊕ 3615G25 BRF SW-.
 00Z C50⊕ 3615 ⊕V⊕.
TCC 031111 C40⊕. 12Z CFP C30⊕6R- 3620. 13Z 10⊕C20⊕5S-F 3620 VRBL
 C5X1/2SF. 19Z 10⊕C25⊕ 3420 OCNL C10X1SW-. 23Z 30⊕ 3415. 02Z O.
 05Z VFR..
HOB 031111 C120⊕. 17Z 50⊕120⊕ 3320G30. 02Z O. 05Z VFR..
INK 031111 250⊕ 3112. 18Z 250-⊕ 3318G30. 01Z 250-⊕ 3315. 05Z VFR..


DAL FT AMD 1 031811 1815Z C12⊕5RW-F 1815G20 CHC C5X1/2T+RW+A
 3335G60. 20Z CFP C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..


GSW FT AMD 1 031811 1815Z C12⊕5RW-F 1815G20 CHC C5X1/2T+RW+A
 335G60. 20Z CFP C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..
```

FIGURE 40. Terminal forecasts.

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```
FA031240
GSW FA 031240
13Z MON-07Z TUE
OTLK 07Z TUE-19Z TUE

NMEX OKLA TEX AND CSTL WTRS

HGTS ASL UNLESS NOTED

SYNS...CDFNT AT 13Z NR A GAG-CDS-MOUTH OF PECOS LN WL MOV EWD
ABT 15 KTS TO NR A FSM-TYR-PSX-MFE LN BY 07Z. MOIST SLY FLO
CONTG E OF FNT.

SIGCLDS AND WX...
NRN NMEX.
70-120 BKN TO OVC WITH SCT SNW SHWRS. MTNS FQTLY OBSCD ABV
70 AND ELSW CIGS LCLY BLO 1 THSD FT VSBY BLO 3 MIS IN SNW
SHWRS AND FOG. TOPS SHWRS 200. CLRG WRN PTN ARND 18Z AND
ERN PTN AFT 00Z. OTLK...VFR.

SRN HLF NMEX AND TEX W OF PECOS RVR.
CLR TO 100 SCT VRBL BKN. OTLK...VFR.

OKLA TEX W OF CDFNT EXCP TEX W OF PECOS RVR.
CLDS 30-50 BKN TO OVC NWRN TEX BCMG OCNLY 10 OVC NRN OKLA.
CIGS LWRG IN SCT RAIN SHWRS WITH RAIN CHG TO SNW THIS AFTN AND
ERY TNGT. PTNS OVR SRN TEX SCT CLDS 50 OR HIR. OTLK...VFR
SRN PTNS. MVFR TO OCNL IFR NRN TEX AND OVR OKLA.

OKLA TEX E OF CDFNT.
WDSPRD CLDS 10 TO 20 OVC WITH CIGS FQTLY BLO 10 VSBY OCNLY
BLO 3 MIS FOG CNTRL AND ERN TEX AND ERN OKLA TIL 18Z. SCT
SHWRS AND A FEW TSTMS ALG CSTL PLNS AND ALG AND ABT 150 MIS
E OF CDFNT WL SPRD OVR ALL OF AREA BY 18Z WITH TSTM ACTVTY
BCMG MORE INTNS DURG AFTN. PSBLY SVR TSTMS NRN TEX AND OKLA
THIS AFTN AND TNGT. TOPS BLDPS 200-250 BLDG RPDLY TO ABV
300 AFT 18Z. OTLK...IFR.

CSTL WTRS.
SCT CLDS 20-30 WITH SCTD SHWRS AND TSTMS. TSTM TOPS 250-300
INCRG TO ABV 350 AFT 18Z. OTLK...MOSTLY MVFR.

ICG...LGT TO LCLY MDT MXD ICGICIP ABV FRZ LVL. FRZ LVL SFC
NRN NMEX SLPG 140 SRN TEX.
```

FIGURE 41. Area forecasts.

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FDUS3 KWBC 301945
DATA BASED ON 301200Z

VALID 011200Z FOR USE 0900-1500Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ABI		2816+12	2819+09	2817+04	2816-11	2117-23	222038	232247	242656
ABQ			2814+12	2224+03	2236-12	2241-24	234340	234550	236258
ALS				2325+03	2244-12	2249-24	225340	225650	237359
AMA		2414	2422+11	2324+05	2126-11	2228-24	222839	222948	233957
ATL	3013	3018+11	3020+07	2920+01	2923-13	3027-25	313441	313750	304059
BNA	3009	2914+13	2814+08	2714+02	2814-12	3018-25	312540	312849	293059
BLD	1512	1816+03	2239+01	2248-04	2260-17	2273-29	238843	239752	738261
BNA	2710	2820+11	2826+06	2831+00	2835-14	2938-26	304441	304550	294259
BOI		1620+01	2127-05	2346-11	2165-25	2173-35	218147	219154	219359
BRO	1416	1517+11	1514+06	1510+01	9900-10	2305-22	251237	271946	293557
CRP	1519	1619+11	1615+06	1611+02	9900-10	2308-22	251538	272047	293357
DAL	1817	2218+12	2116+08	2114+02	1911-11	2211-23	241439	251648	241757
DEN			2420+11	2539+02	2344-13	2350-25	235841	236451	237959
DRT	1517	1519+11	1619+09	1716+04	1913-10	2215-22	241938	252347	273456
DSM	1225	1619+05	2116+03	2519-01	2839-13	2852-25	296741	297650	298560
ELP		1906	2010+10	2017+04	2121-10	2223-23	232439	242649	244457
GCK		2518+12	2523+11	2424+05	2328-11	2332-24	233640	243950	254857
GJT			2010+07	2234-01	2262-15	2270-26	227842	228551	720861
HLC		2518+10	2422+11	2424+04	2428-11	2434-24	244340	254850	265558
HOU	1615	1712+10	1710+06	1507+02	9900-11	2505-23	271238	271647	282157
ICT	2420	2427+12	2429+11	2427+04	2422-11	2526-24	253240	263649	264058
IND	0412	3012+04	2823+01	2833-04	2951-16	2960-27	307142	307650	307658
INK		1910+10	2015+11	2017+05	2020-10	2120-23	222038	232348	253956
JAN	2406	2206+13	2106+07	1905+02	9900-12	3007-24	321639	301948	272760
JAX	3409	3412+12	3511+07	3510+01	3311-12	3217-25	322540	313249	294459
JFK	3231	3244-10	3151-12	3059-15	3082-23	7902-33	791846	791651	790054
JDT	0828	0405+04	2914+00	2829-04	2851-16	2960-27	297342	308150	309059
LIT	2323	2424+13	2420+08	2417+03	2513-11	2816-24	302339	292649	282859
LOU	3207	2918+06	2826+02	2835-03	2948-15	2955-27	306342	306750	306558
LRD	1419	1521+11	1618+07	1614+02	1907-10	2210-22	241737	262246	293556
MEM	2517	2620+13	2620+08	2619+02	2720-12	2923-24	302940	303149	283259
MIA	9707	8912+10	8810+06	8609+02	3608-10	3116-22	303137	303946	294857
MKC	1918	2224+10	2426+08	2526+02	2730-11	2838-24	284840	285249	285659
MOB	9908	1305+12	1305+07	1306+02	9900-12	3207-24	311739	302248	273359
MSY	1206	1310+11	1210+06	1209+01	9900-12	3205-23	311538	292147	273158
OKC	2218	2425+13	2426+10	2324+04	2119-11	2219-24	242039	242248	242458
PRC			2231+04	2241-02	2249-14	2259-26	237142	237751	228061
SAT	1520	1621+12	1618+07	1714+02	1908-10	2211-22	241738	262147	282856
SAT	1520	1621+12	1618+07	1714+02	1908-10	2211-22	241738	262147	282856
SGF	2226	2430+12	2529+08	2526+03	2625-11	2830-24	293840	294149	294259
SHV	2115	2214+12	2111+07	1909+02	1806-11	2605-23	291239	281548	262059
SLC		1815	1919+02	2246-07	2271-19	2282-30	229344	720253	710961
STL	1412	2211+10	2520+06	2730+00	2845-13	2951-25	305941	306149	305959
TLH	0305	9900+12	9900+07	9900+02	9900-12	3211-24	312139	302848	294059
TUS		2008+15	2017+07	2125+01	2233-12	2238-24	234540	234850	225760

FIGURE 42. Winds aloft forecasts.

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```
MKC UA 1353 DURGD 35 NE MKC HEAVY TO MDT TURBC 100-40. LEAR
TOPS OF EVERYTHING 170. BE100


MAF UA 1400 32N MAF MDT TURBC OCNL GRATER THAN MDT 110 B727


MLC UA 1700 VCNTY EUFAULA CIGS 10-18AGL CRB ICG C150

FTW UA 1705
6NW GSW LGT-MDT TURBC 20 C500


DAL UA 2024 20E GSW SVR TURBC 330-370 B727


TUL UA 2033 24 SW TUL AND W AND SW R-- 8-12⊎ AGL

DAL UUA 2058 TYR MDT TURBC A ALT MISG B727

TYR UA 2107 10 S TYR MDT-SVR TURBC HAIL 90 CV60
```

FIGURE 43. Pilot reports.

```
NNNNZCZC
UBUS1 KGSW 0316A5
OKLA OKC UA
     OKC 1615 35W OKC LGT-MDT TURBC SVR WAVE EFFECT 370 G159
TEX  AMA UA 1615 OVR AMA ⊕140 HIR NW
     AMA UA 1621 DURGC NW BND LGT TURBC 240-260 ⊕260 C500
     BGS PIREP 40 W FST 1600 280⊕V⊕ WND 2465 LGT-MDT CAT 330 OVR ELP
     BSM PIREP A0SW BSM 1622 15⊕60 CLR ABV CAT NONE 070 RF4
     FTW UA
     FTW UUA 1615 8S FTW SVR TURBC 50 PA31
     FWH PIREP 10S FWH 1620 SVR TURB 050 NAVAHO
     GLS UA 1624 DURGC NW BND TOPS GLS-HOU 140 ISOLD BLDPS 180-200
     PSX UA 1606 AAP-PSX 12-15⊕ SCTD RW-
     REE PIREP 2SW GTH 1618 LO ⊕ BLO 100⊕150 LGT-OCNL MDT TURBC
      NEG ICG 100 02
NMEX ABQ UA
     ABQ UUA 1627 100 W ABQ LGT TO MDT TURBC FL230-260 DC9.
     40E ABQ LGT TO MDT TURBC FL170-200 DC9
     CVS PIREP 50W CVS 1615 ⊕220 F-111
     CVS PIREP OVR CVS 1605 52⊕110 F-111
```

FIGURE 44. Pilot report summaries.

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```
WMS CNCL
ZCZC
 OKC
 NOT IN SYS
170 TWEB 301408 GSW-SHV. SCT-BKN CLDS ABV 10 THSD WITH FEW
PATCHES OF FOG LCLY LWRG VSBY BLO 3 MI TIL LATE MRNG. CONDS
WL LWR DURG AFTN TO ARND 2-3 THSD SCT-BKN AND WL BCM OVC AFDK.
CHC OF TSTMS IN SHV AREA AFTN.
```

FIGURE 45. TWEB route forecasts.

```
MKC AC 031500
MKC AC 031500
VALID 031500-041200Z

SVR TSTMS...A FEW EXPCD THIS AFTN AND EVE S CNTRL AND ERN
OKLA WRN ARK CNTRL AND ERN TEX AND WRN LA.

GEN TSTMS...RT OF A LN 60E DRT BWD CDS GAG CNU CGI CBM PNS. ALSO
TO THE RT OF LN OMK LKV SFO.
OSTBY
RL 1516
```

FIGURE 46. Severe weather outlook.

```
GSW WA 031950
031950-040200

AIRMET ECHO 3. FLT PRCTN. CNTRL AND ERN OKLA AND NERN TEX
GENLY E OF END-LFK LN CIGS FQTLY BLO 1 THSD FT VSBYS FQTLY
BLO 3 MI. CONDS IPVG TEX PTN BY 00Z BUT CONTG OKLA PTN PAST
02Z.
```

FIGURE 47. AIRMET.

```
GSW WS 032030
032030-040100

SIGMET FOXTROT 3. FLT PRCTN. ERN OKLA ERN TEX NMRS TSTMS. LN NMRS
TSTMS 2030Z 25 WD NR PNC 30E DAL TO CLL MOVG EWD 25 KT. CB TOPS
TO 400. TSTMS MOVG TO EXTRM ERN OKLA AND EXTRM ERN TEX BDR SECS
BY 01Z AND CONTG
```

FIGURE 48. SIGMET.

BEST COPY AVAILABLE


```
MKC WW 032108
MKC 032108

BULLETIN

TORNADO WATCH NUMBER 560
ISSUED 3.08 PM CST DEC 3 1973

A....THE NATIONAL WEATHER SERVICE HAS ISSUED A TORNADO WATCH FOR...

PORTIONS OF EASTERN TEXAS

THE THREAT OF TORNADOES AND SEVERE THUNDERSTORMS WITH LARGE HAIL
AND DAMAGING WINDS WILL EXIST IN THESE AREAS FROM CURRENT UNTIL
7.00 PM CST THIS MONDAY AFTERNOON AND EVENING.

THE GREATEST THREAT OF TORNADOES AND SEVERE THUNDERSTORMS IS IN
AN AREA 70 MILES....60 NAUTICAL EAST AND WEST OF A LINE FROM 45
MILES....40 NAUTICAL....NORTH OF TYLER TEXAS TO 25 MILES...20
NAUTICAL...EAST OF COLLEGE STATION TEXAS.

PERSONS IN OR CLOSE TO THE TORNADO WATCH AREA ARE ADVISED TO BE
ON THE WATCH FOR LOCAL WEATHER DEVELOPMENTS AND FOR LATER
STATEMENTS AND WARNINGS.

C...TORNADOES AND A FEW SVR TSTMS WITH HAIL SFC AND ALF TO 2 IN.

EXTRM TURBC AND SFC WND GUSTS TO 70K. A FEW CBS WITH MAX TOPS TO 550.

MEAN WIND VECTOR 21045
```

FIGURE 49. Severe weather forecast.

```
SDUS KNKA 031957
AMA 1932 AREA3R-S/NC 334/120 62/165 223/100 284/122 ELEMENTS 2232
MT 220 AT 347/72    S WRN HLF AND MSTLY R- ERN HLF
 112 12111 12111 10000 000 0


OKC 1933 LN10 TRW++/NC 348/100 332/50 185/80 10W 2625 CELLS 2035
MT 320 AT 337/40
AREA4 TRW+/NC 290/125 120/130 200W CELLS 2035 MT 300 AT 119/53
 1440 0641 114411 014421 +22


HDO 19-8% 43  3TRW+/NC 45/210 105/130 66/70 CELLS 2130 MT 280
AT 61/120 MSTLY TRW
AREA 3R-/NEW 335/95 D55 MT 200 UNIFORM
 01100 00000 00004 00002 00000
```

FIGURE 50. Radar summaries.

BEST COPY AVAILABLE

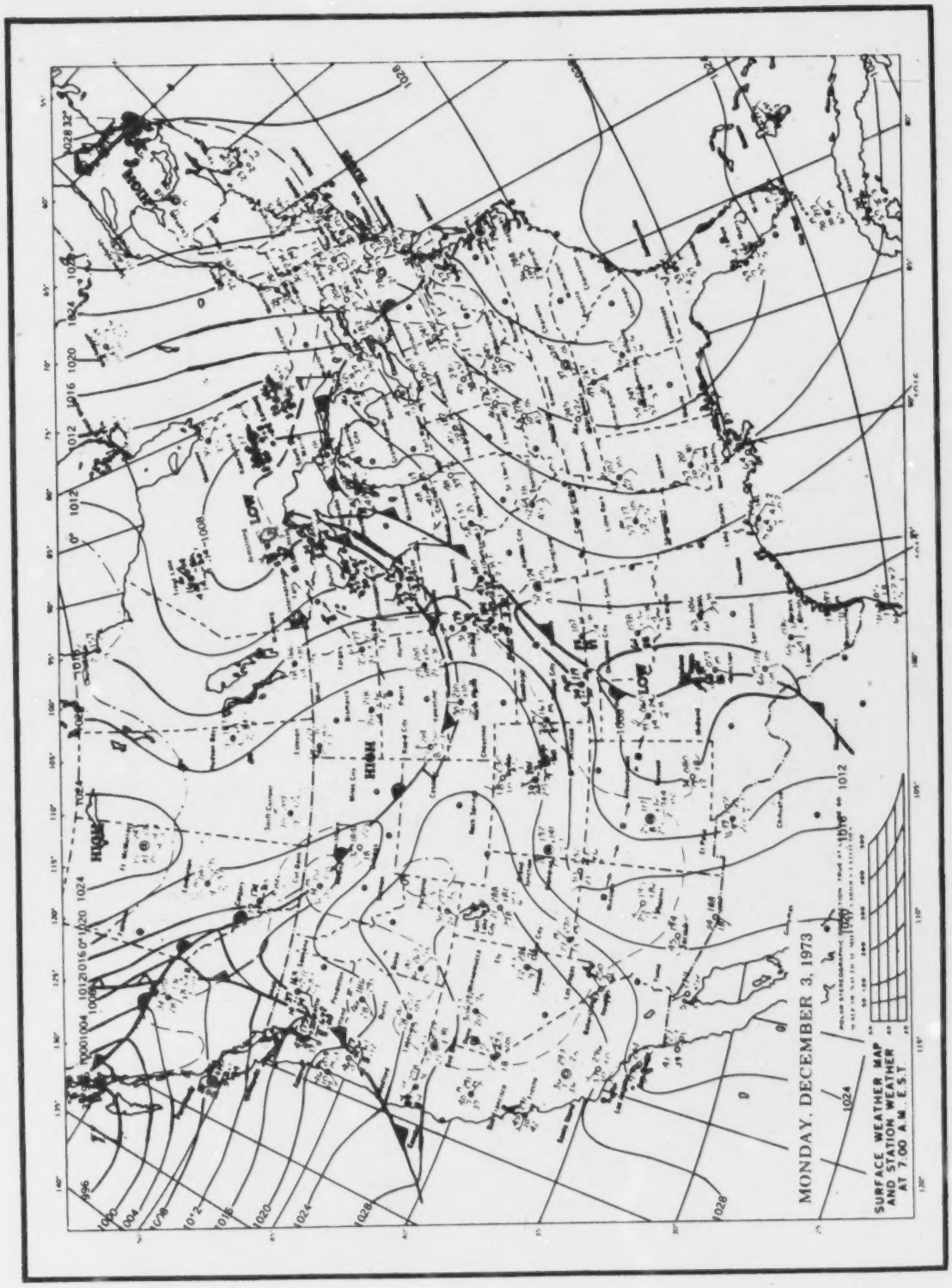

FIGURE 51. Surface weather map.

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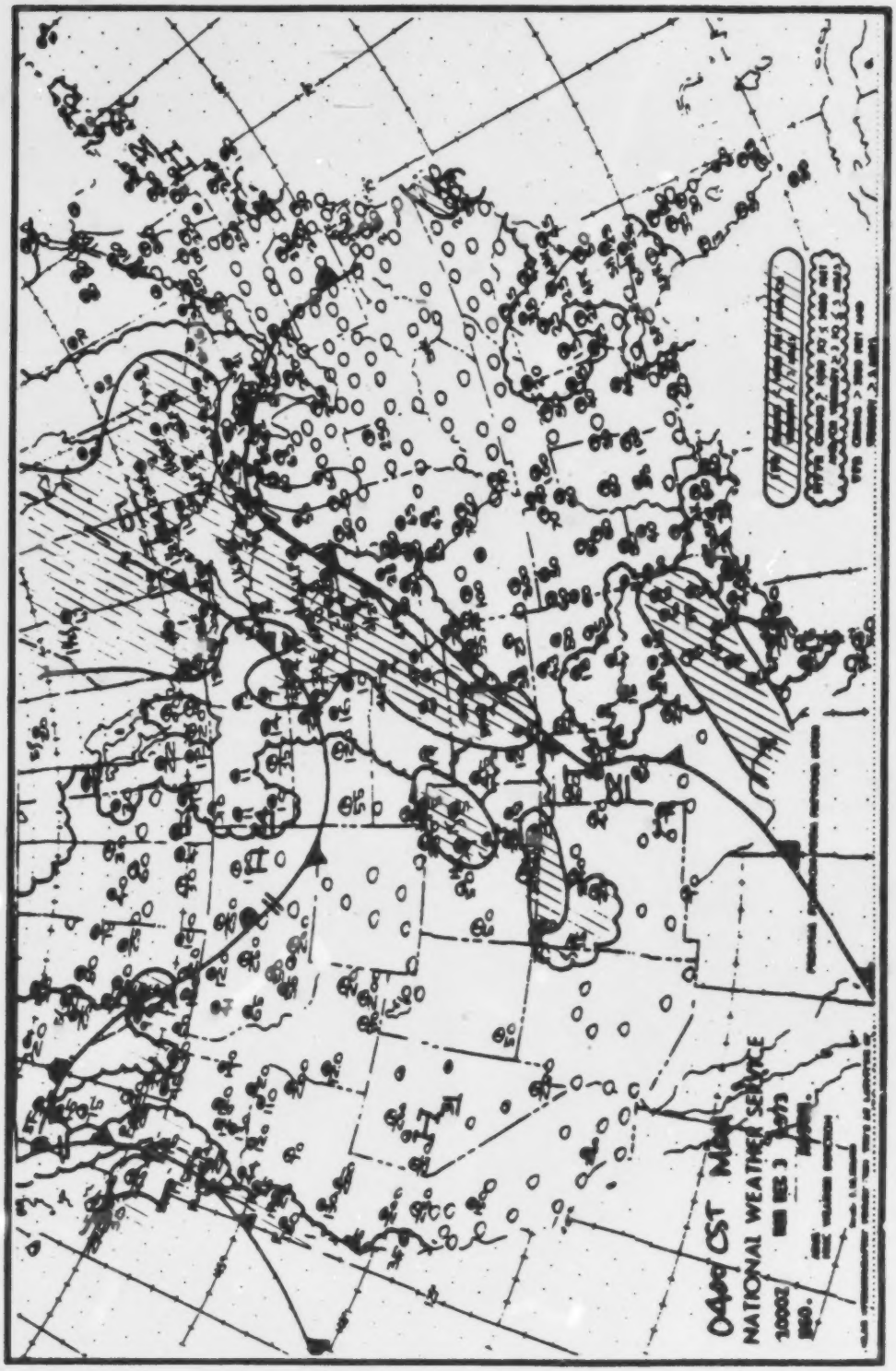

FIGURE 52. Weather depiction map.

62

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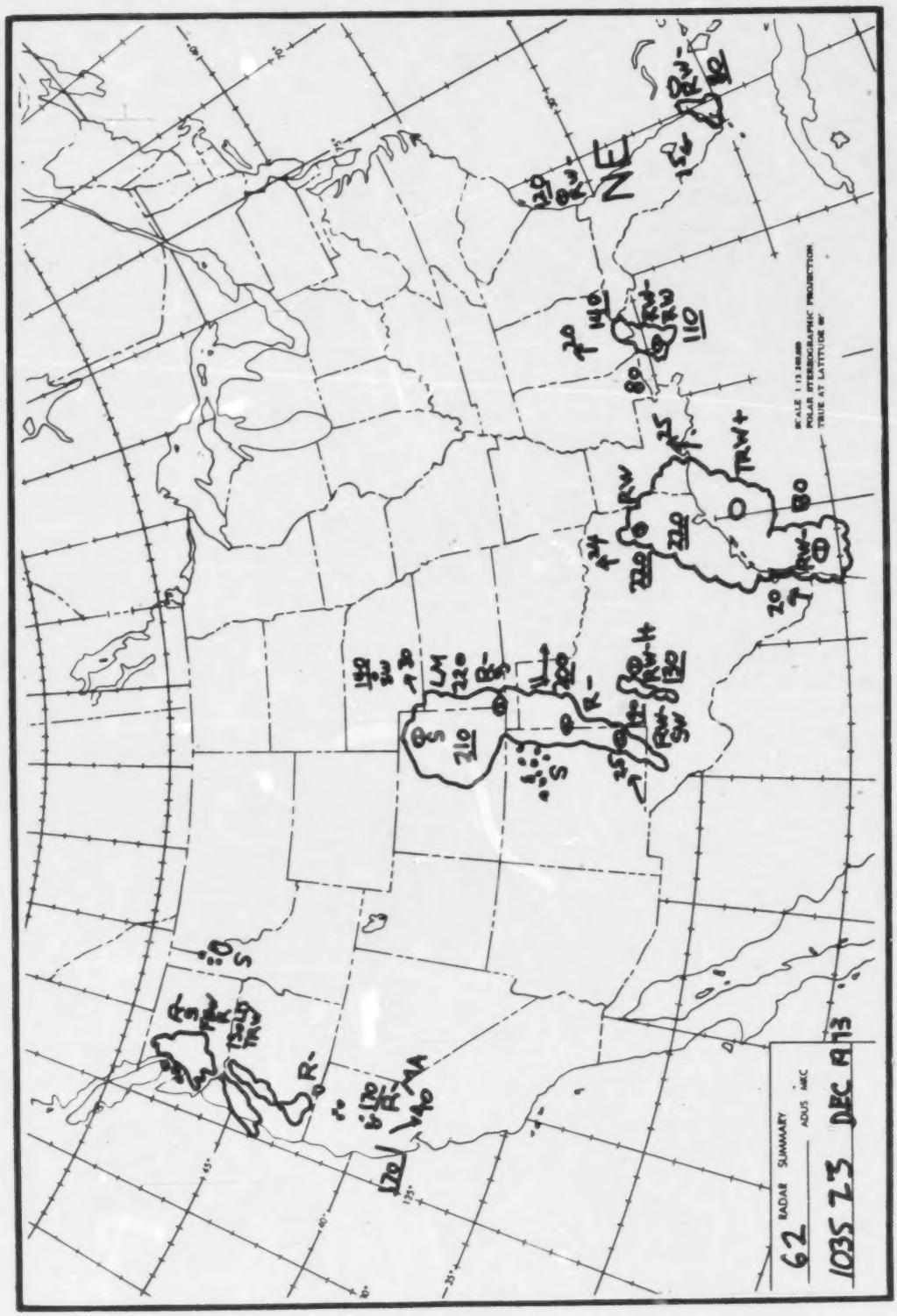

FIGURE 53. Radar summary.

BEST COPY AVAILABLE

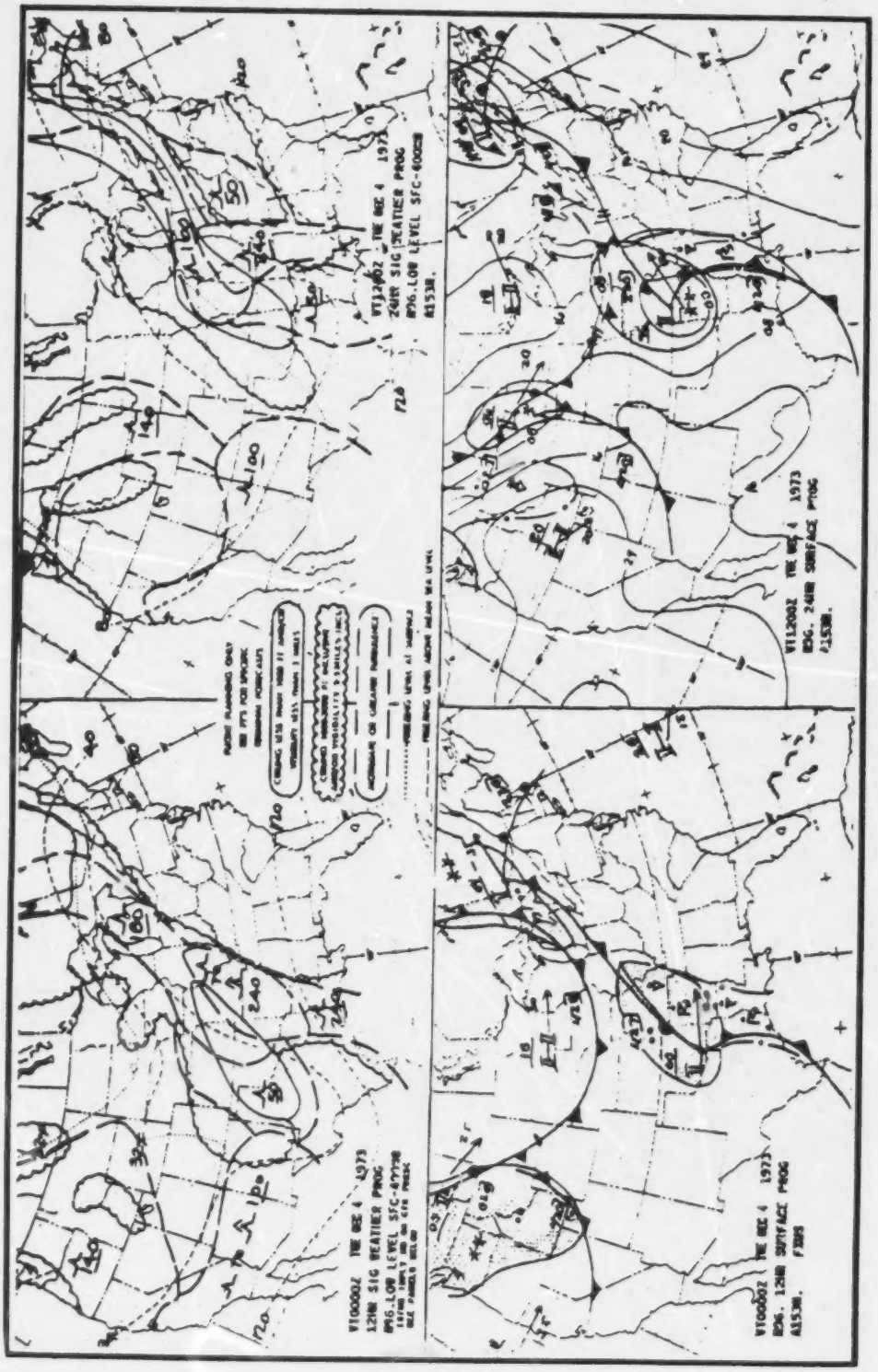

FIGURE 54. Prognostic charts, 12 and 24 hour.

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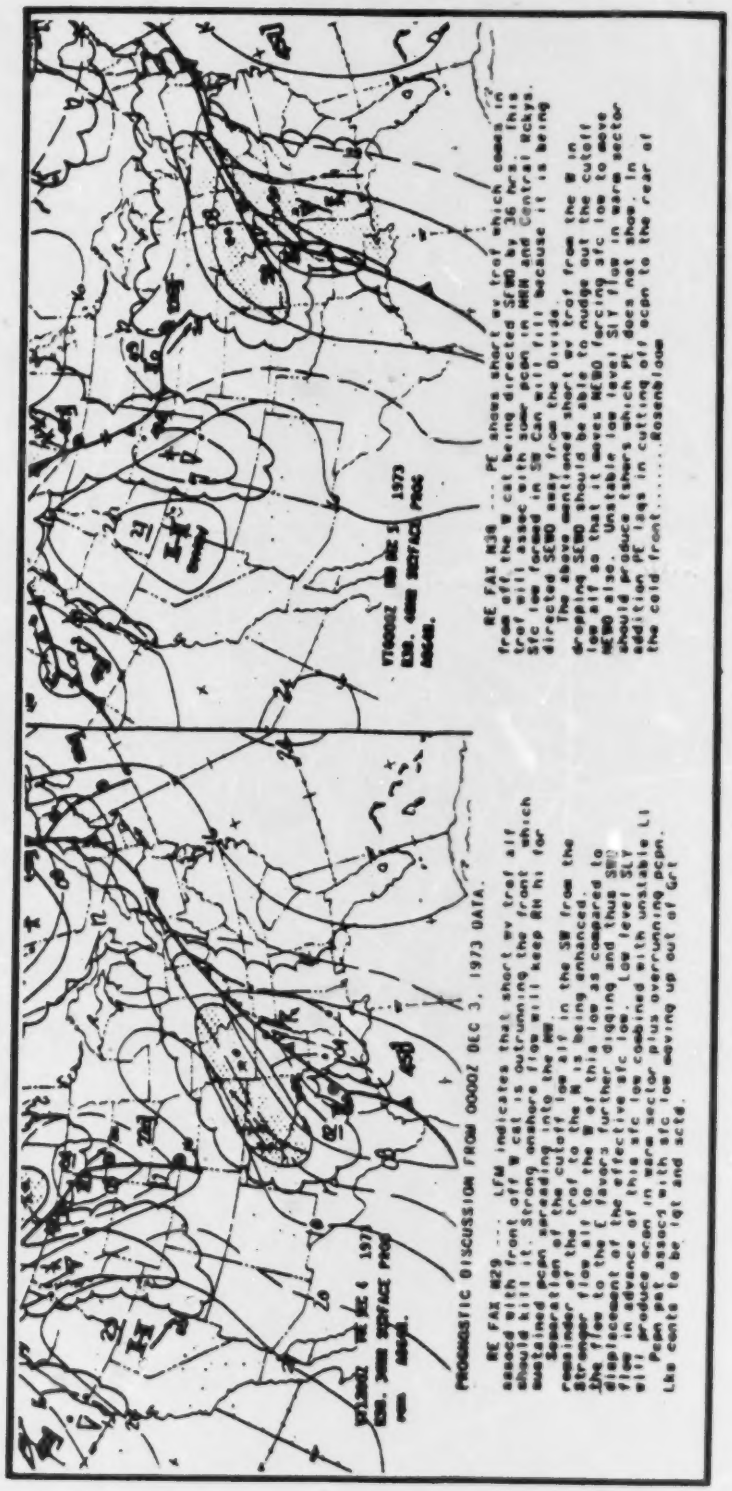
PROGNOSTIC DISCUSSION FROM 0000Z DEC 3, 1973 DATA.
RE FAX H29 --- LFM indicates that short wv trof aloft
assocd with front off W cst is outrunning the front which
should kill it. Strong onshore flow will keep RH hi for
sustained pcpn spreading into the NW.
Separation of the cutoff low aloft in the SW from the
remainder of the trof to the N is being enhanced.
Stronger flow aloft to the W of this low as compared to
the flow to the E favors further digging and thus SEWD
displacement of the effective sfc low. Low level SLY
flow in advance of this sfc low combined with unstable LI
aloft in advance of the cutoff should produce numerous
Pcpn pat assocd with sfc low plus overrunning pcpn.
Lks cents to be lgt and scte.
RE FAX H36 --- PE shows short wv trof which comes in
from off the W cst being directed SEWD by 36 hrs. This
trof will assoc with some pcpn in NRN and Central Rckys.
Sfc low forced in SW Can will fill because it is being
directed SEWD away from the Divide.
The above mentioned short wv trof from the W in
dropping SEWD should be able to nudge out the cutoff
low aloft so that it moves NEWD forcing sfc low to move
NEWD also. Unstable low level SLY flow in warm sector
should produce thnrs which PE does not show. In
addition PE lags in cutting off pcpn to the rear of
the cold front.....Rosenbloom

FIGURE 55. Prognostic charts, 36 and 48 hour.

BEST COPY AVAILABLE

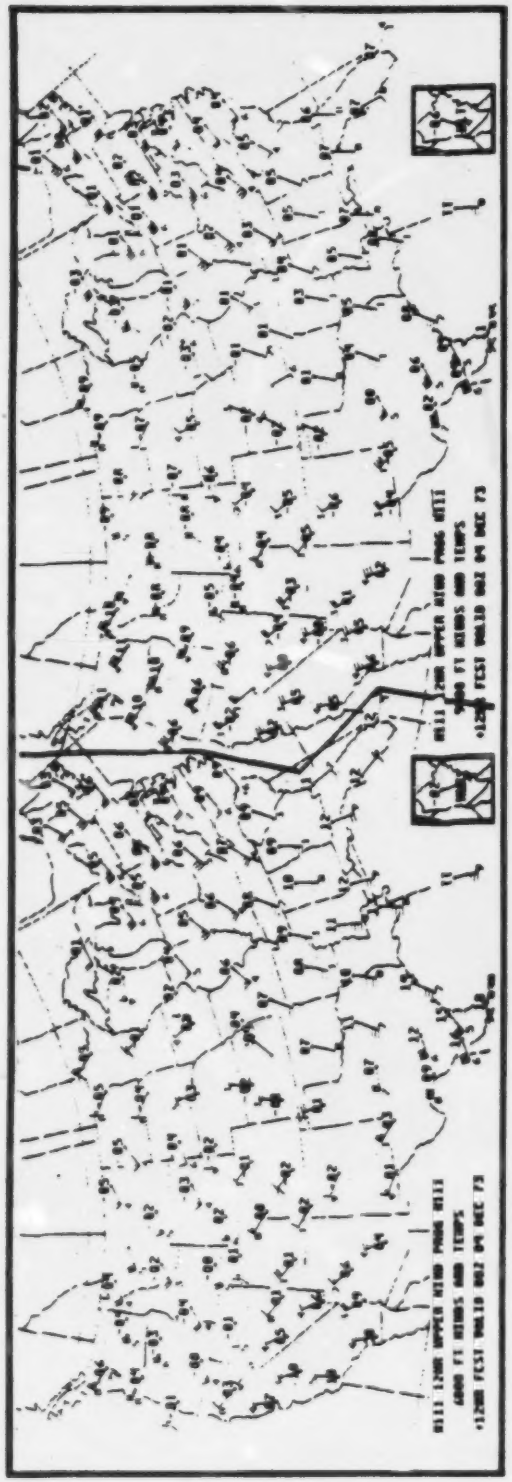

FIGURE 56. Upper wind prognoses.

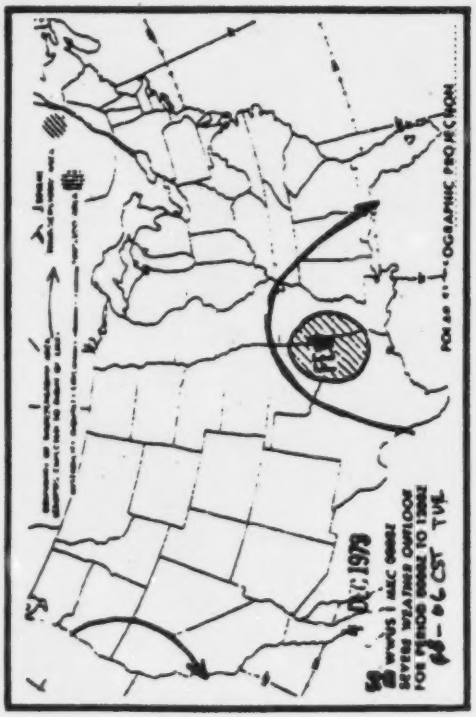

FIGURE 57. Severe weather outlook.

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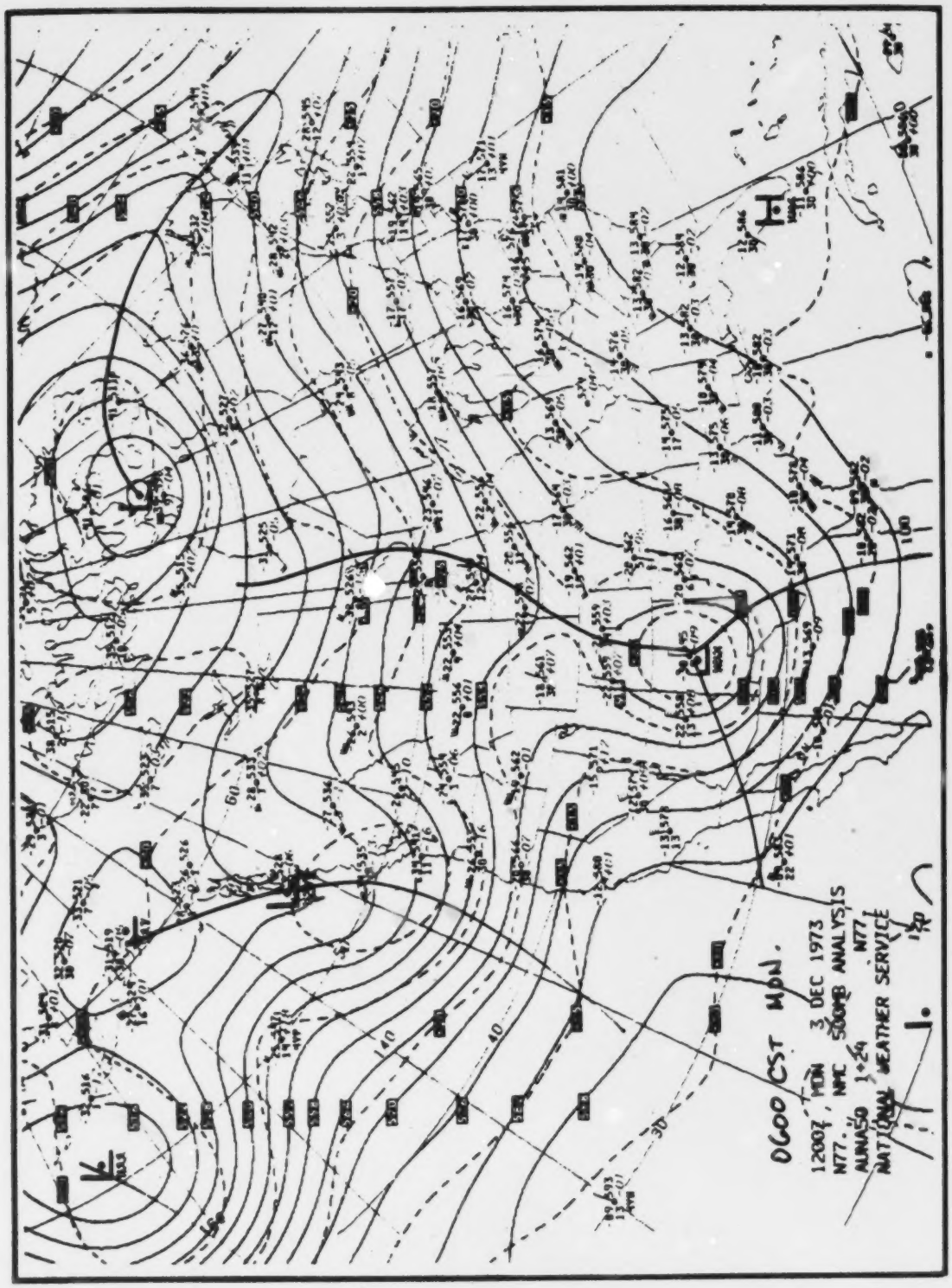

FIGURE 58. 500-millibar analysis.

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APPENDIX I—Airman's Information Manual Excerpts

The Airman's Information Manual has been designed primarily as a pilot's operational and information manual for use in the National Airspace System of the United States (unless otherwise indicated). It is divided into four basic parts, each of which may be purchased separately. Frequency of issuance, area of coverage, annual subscription costs and highlights of the contents of each part follow.

Part 1—Basic Flight Manual and ATC Procedures

Issued: Quarterly (Feb., May, Aug., Nov). *Coverage:* Entire U.S. unless otherwise indicated.

This part contains the basic fundamentals required to fly in the U.S. National Airspace System. Among other data it also contains adverse factors affecting Safety of Flight; Health and Medical Facts of interest to pilots; ATC information affecting rules, regulations and procedures; a Glossary of Aeronautical terms; Air Defense Identification Zones (ADIZ); Designated Mountainous Areas; and Emergency Procedures.

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

Part 2—Airport Directory

Issued: Semiannually (Mar. and Sept.). *Coverage:* Conterminous U.S., Puerto Rico and Virgin Islands (Note: similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively–See Special Notice Section, Part 3 for availability.)

Part 2 contains a Directory of all airports, seaplane bases, and heliports available for civil use. It includes all their services, *except communications*, in codified form. (Those airports with communications are also listed in Part 3.) A list of new and permanently closed airports which updates Part 2 is contained in Part 3. Also included in Part 2 are U.S. Entry and Departure Procedures, including Airports of Entry and Landing Rights Airports; and a listing of Flight Service Station and National Weather Service Telephone Numbers.

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

Parts 3 and 3A—Operational Data and Notices to Airmen

Issued: Part 3, every 56 days and Part 3A, every 14 days (between issues of Part 3). *Coverage:* Part 3, Conterminous U.S., Puerto Rico and Virgin Islands (Note: Similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively—(For sale by National Ocean Survey, Distribution Division, C44, Riverdale, Md. 20840). Part 3A coverage is the same as Part 3 except that Notice-to-Airmen data for Puerto Rico and Virgin Islands appears in the International NOTAMS publication).

Part 3 contains an Airport-Facility Directory of all major airports with control towers and/or instrument landing systems; a tabulation of Air Navigation Radio Aids; Special, General, Area Notices; Notices to Airmen and FDC NOTAMS; a tabulation of New and Permanently Closed Airports (which updates Part 2), and supplemental data to Part 4.

Part 3A contains current Notices to Airmen considered essential to the safety of flight, and FDC NOTAMS as well as supplemental data to Parts 3 and 4.

Annual Subscription: $22.00 for U.S., Canada and Mexico, plus $5.50 for other foreign mailing.

Part 4—Graphic Notices and Supplemental Data

Issued: Quarterly (Jan., April, July, Oct.). *Coverage:* Conterminous U.S., Puerto Rico and Virgin Islands (Note: similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively—(For sale by National Ocean Survey, Distribution Division, C44, Riverdale, Md. 20840).

Part 4 contains a list of abbreviations used in the AIM; a tabulation of Parachute Jump Areas; locations of VOR Receiver Check Points (both Ground and Airborne); Restrictions to Enroute Navigation Aids; Preferred Routes; Area Navigation Routes; Special Notice—Area Graphics; Terminal Area Graphics: Olive Branch Routes and other data not requiring frequent change.

Annual Subscription: $9.50 for U.S., Canada and Mexico, plus $2.50 for other foreign mailing.

Where to Purchase AIM

The four basic parts described above are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Orders should be accompanied by check or money order made payable to the Superintendent of Documents.

Errors, Omissions, or Changes

Errors, omissions, or suggested changes should be forwarded to the Federal Aviation Administration, Flight Services Division, AAT-430, Washington, D.C. 20591.

FIGURE 59. General information.

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Flight Service Stations (FSS) and Combined Station/Tower (CS/T) provide information on airport conditions, radio aids and other facilities, and process flight plans. CS/T personnel are not certificated pilot weather briefers; however, they provide factual data from weather reports and forecasts. Airport Advisory Service is provided at the pilot's request on 123.6 by FSSs located at airports where there are not control towers in operation. (See Part 1 ADVISORIES AT NON TOWER AIRPORTS.)

The telephone area code number is shown in parentheses. Each number given is the preferred telephone number to obtain flight weather information. Automatic answering devices are sometimes used on listed lines to given general local weather information during peak workloads. To avoid getting the recorded general weather announcement, use the selected telephone number listed.

★ Indicates Pilot's Automatic Telephone Weather Answering Service (PATWAS) or telephone connected to the Transcribed Weather Broadcast (TWEB) providing transcribed aviation weather information.

◆ Indicates a restricted number, use for aviation weather information

▬ Call FSS for "one call" FSS/WSO briefing service.

s Automatic Aviation Weather Service (AAWS).

Location and Identifier		Area Code	Telephone
ALABAMA			
Anniston ANB	FSS	(205)	831-2303
Birmingham BHM	FSS	(205)	595-6151▬
	FSS	(205)	595-2101★
Dothan DHN	FSS	(205)	794-6683
Huntsville	WS	(205)	772-9308◆
Mobile MOB (Bates)	FSS	(205)	344-3610
	WS	(205)	342-2762◆
Montgomery MGM (Dannelly)	FSS	(205)	269-4368
	WS	(205)	265-0589◆
Muscle Shoals MSL	FSS	(205)	383-6541▬
	FSS	(205)	381-2500★
ARIZONA			
Douglas DUG (Bisbee-Douglas)	FSS	(602)	364-8458
Flagstaff	WS	(602)	774-2851
Phoenix PHX (Sky Harbor)	FSS	(602)	261-4295▬
Prescott PRC	FSS	(602)	445-2160
Tucson TUS	FSS	(602)	792-6359▬
Winslow	WS	(602)	289-3592
Yuma YUM	FSS	(602)	726-2601▬
ARKANSAS			
El Dorado ELD (Goodwin)	FSS	(501)	863-5128
Fayetteville FYV (Drake)	FSS	(501)	HI 2-8277
Ft. Smith FSM	CS/T	(501)	MI 6-7868/69
		(501)	782-0343▬
	(answered in Fayetteville)		
	WS	(501)	646-5731

Location and Identifier		Area Code	Telephone
ARKANSAS (Con't)			
Harrison HRO	FSS	(501)	EM 5-3433
Jonesboro JBR	FSS	(501)	WE 5-3471
	(0600-2200 Other hrs. Memphis)		
Little Rock	WS	(501)	374-1546◆
Pine Bluff PBF (Grider)	FSS	(501)	JE 5-0652
Texarkana TXK	CS/T	(501)	774-4151▬
CALIFORNIA			
Arcata ACV	FSS	(707)	839-1545
Bakersfield BFL (Meadows)	FSS	(805)	399-1787▬
(No wea bcst avbl 2300-0500 lcl time)			
Bishop	WS	(714)	873-3213
			(0545-1915)
Blythe BLH	FSS	(714)	948-8151
Crescent City CEC (McNamara Fld)	FSS	(707)	464-2514
	(0600-2200 other hrs Arcata)		
Daggett DAG	FSS	(714)	254-2223
Eureka	WS	(707)	442-2171◆
Fresno FAT (Air Terminal)	FSS	(209)	251-8289▬
Imperial IPL	FSS	(714)	352-8740
Los Angeles LAX (International)	FSS	(213)	776-2727▬
		(213)	670-1000▬
Van Nuys		(213)	781-5213▬
Long Beach		(213)	639-2618▬
		(714)	542-3585▬
Burbank		(213)	845-3211▬
Fullerton		(714)	879-8381
Santa Ana		(714)	546-5901

FIGURE 60. FSS and WS telephone numbers.

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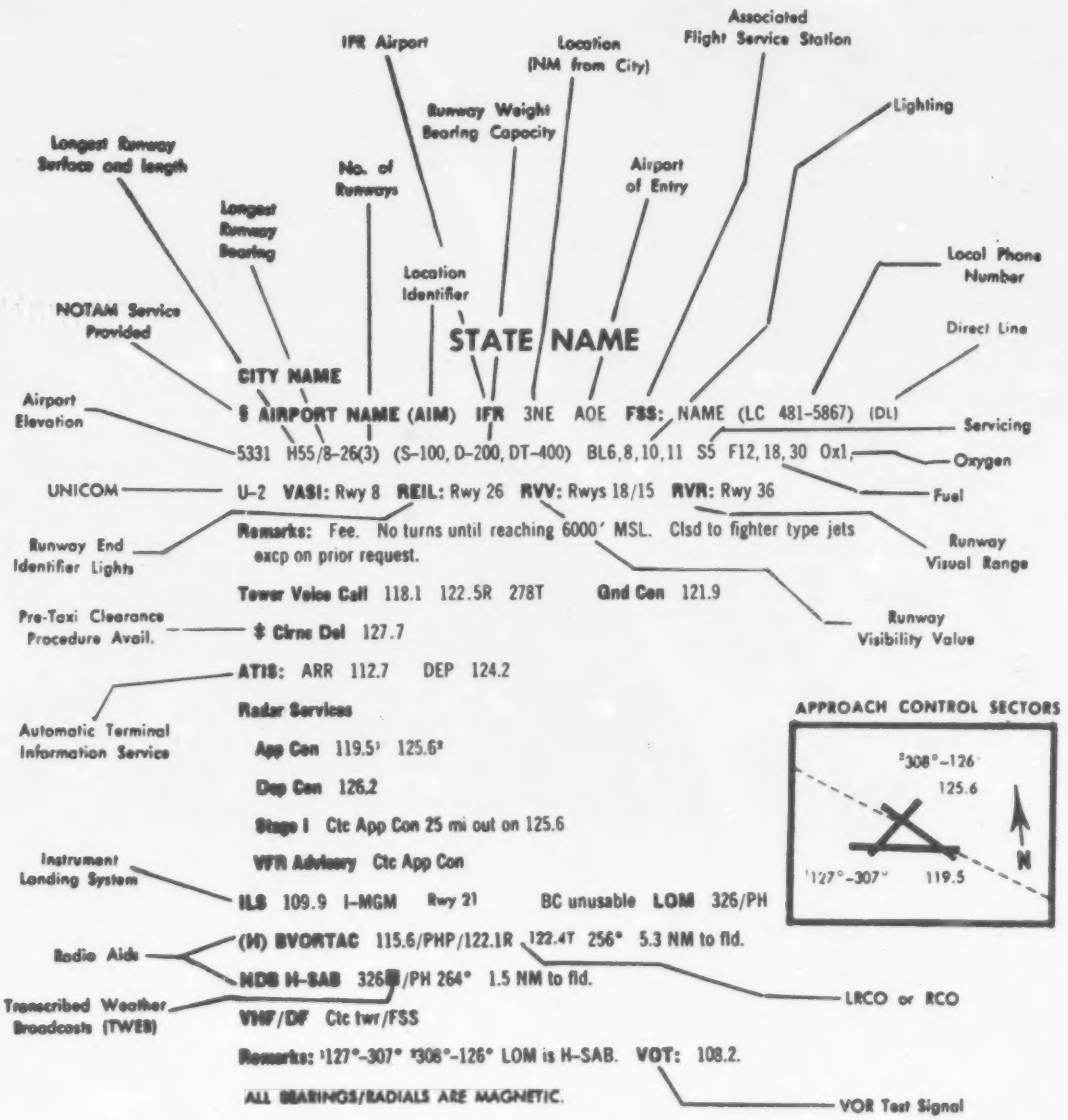
IFR Airport
Location (NM from City)
Associated Flight Service Station
Runway Weight Bearing Capacity
Lighting
Longest Runway Surface and length
No. of Runways
Airport of Entry
Longest Runway Bearing
Local Phone Number
Location Identifier
NOTAM Service Provided
STATE NAME
Direct Line
CITY NAME
Airport Elevation
§ AIRPORT NAME (AIM) IFR 3NE AOE FSS: NAME (LC 481-5867) (DL)
Servicing
5331 H55/8-26(3) (S-100, D-200, DT-400) BL6,8,10,11 S5 F12,18,30 Ox1,
Oxygen
UNICOM
U-2 VASI: Rwy 8 REIL: Rwy 26 RVV: Rwys 18/15 RVR: Rwy 36
Fuel
Runway End Identifier Lights
Remarks: Fee. No turns until reaching 6000' MSL. Clsd to fighter type jets excp on prior request.
Runway Visual Range
Tower Voice Call 118.1 122.5R 278T Gnd Con 121.9
Pre-Taxi Clearance Procedure Avail.
$ Clrnc Del 127.7
Runway Visibility Value
ATIS: ARR 112.7 DEP 124.2
Automatic Terminal Information Service
Radar Services
App Con 119.5[1] 125.6[2]
Dep Con 126.2
Stage I Ctc App Con 25 mi out on 125.6
VFR Advisory Ctc App Con
APPROACH CONTROL SECTORS
[2]308°-126°
125.6
N
[1]127°-307°
119.5
Instrument Landing System
ILS 109.9 I-MGM Rwy 21 BC unusable LOM 326/PH
Radio Aids
(H) BVORTAC 115.6/PHP/122.1R 122.4T 256° 5.3 NM to fld.
NDB H-SAB 326/PH 264° 1.5 NM to fld.
LRCO or RCO
Transcribed Weather Broadcasts (TWEB)
VHF/DF Ctc twr/FSS
Remarks: [1]127°-307° [2]308°-126° LOM is H-SAB. VOT: 108.2.
ALL BEARINGS/RADIALS ARE MAGNETIC.
VOR Test Signal

FIGURE 61. Airport/facility directory sample.

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CONNECTICUT—*Continued*

NEW HAVEN **FSS:** WINDSOR LOCKS

§ TWEED-NEW HAVEN (HVN) ***IFR*** 4SE LRA (LC 776–9735)
13 H56/2–20(2) (S–112, D–155, DT–275) BL5,6,11 S5 F12,18,30
REIL: Rwy 2, 20

Remarks: Rgt turn dptr rwy 20 made after passing shoreline. Rwy 14 clsd to ngt lndg. Rwy 14 threshold dsplcd 883'. Touch and go operations permitted 0700–2200 Mon-Sat, 0800–2200 Sun.

New Haven Tower 124.8 **Gnd Con** 121.7
Westchester App Con 128.35
Westchester Dep Con 128.35
VFR Advisory Ctc Westchester App Con
ILS 109.1 I–HVN Rwy 2 BC unusable
New Haven (T) BVOR 110.0/HVN on fld

Remarks: Twr opers 0600–2400. Freq 121.5 not avbl. GS not monitored 2400–0600. VOR unmonitored 2400–0600 lcl.

NORWICH (L) BVORTAC 109.8/ORW/122.1R **FSS:** PROVIDENCE

OXFORD NDB MHW 257/OXC **FSS:** WINDSOR LOCKS

Remarks: Non-federal facility. Unmonitored 0000–0700.

PUTNAM (H) BVORTAC 117.4/PUT **FSS:** WORCESTER

TRUMBULL (T) BVOR 108.4/TMU/122.1R **FSS:** WINDSOR LOCKS

WINDSOR LOCKS FSS 121.5 122.2 122.3

WINDSOR LOCKS

§ BRADLEY INTL (BDL) ***IFR*** 3W LRA **FSS:** WINDSOR LOCKS on Fld
173 H95/6–24(3) (S–200, D–200, DT–350) BL5,6,8,10,11,14,15 S5 F12,18,30 Ox1,2,3,4 U2 **VASI:** Rwy 24, 33 **REIL:** Rwy 24, 33 **RVR:** Rwy 6, 24 **RVV:** Rwy 6, 24

Remarks: 700' overrun on NE end rwy 6. A-gear located in overrun area all rwys. Rwy 15–33 (S–99, D–188, DT–384). Fee. VASI rwy 24 TCH 52', RRP 1000'. VASI rwy 33 TCH 34', RRP 750'.

Bradley Tower 120.3 **Gnd Con** 121.9
ATIS: 114.9 (Arr) 371 (Dep)

Radar Services:
Bradley App Con 121.2 123.85
Bradley Dep Con 125.35
Stage II Arr 123.85 from West of LOC crs. Arr 121.2 from East of LOC crs. Dep 125.35.
ILS 111.1 I–BDL Rwy 6 **LOM:** 388/BD

Remarks: ATIS 114.9 opers 0600–0100. Other hrs ctc App Con 121.2.

DELAWARE

KENTON (L) BVORTAC 111.4/ENO/122.1R **FSS:** MILLVILLE

NEW CASTLE (L) VORTAC 114.0/EWT **FSS:** PHILADELPHIA

WATERLOO (L) BVORTAC 112.6/ATR/122.1R **FSS:** SALISBURY

WILMINGTON

§ GREATER WILMINGTON (ILG) ***IFR*** 5S LRA **FSS:** MILLVILLE (LC 652–3479)
79 .H72/9–27(3) (S–90, D–140, DT–250) BL5,6,8,11 S5 F12,18,30 Ox1,2,3,4 U2 **RVR:** Rwy 1 **RVV:** Rwy 1 **REIL:** Rwy 9

Remarks: ILS apch rwy 1 has a one foot penetration in the 50:1 plane. Fee for acft over 12,500 lbs. Rwy 9–27 clsd to all air carrier turbojet training flights.

DISTRICT OF COLUMBIA

GEORGETOWN NDB MHW 323/GTN **FSS:** WASHINGTON

WASHINGTON FSS 121.5 122.2 122.0 122.6

WASHINGTON

§ DULLES INTL (IAD) ***IFR*** 21W (4 NW Chantilly, Va.) LRA **FSS:** WASHINGTON (DL)
313 H115/1L–19R(6) (S–200, D–250, DT–450) BL5,6,7A,8,10,13,14,15 S5 F18,22,30 Ox1,2 U2 **VASI:** Rwy 1S, 12, 19S, 30 **RVR:** Rwy 1R–19L, 19R

Remarks: Fee. Itinerant acft 12,000 lbs or less ctc FBO prior to lndg. 2 box VASI rwy 1S TCH–180', RRP–175'; 2 box VASI rwy 19S TCH–185', RRP–175'; 4 box VASI rwy 12 TCH–37', RRP–950'. VASI rwy 30 TCH–83', RRP–1600'. B–747 acft cannot pass another B–747 parked on same side of jet apron without the ass stance of wing walkers.

Dulles Tower 120.1 **Gnd Con** 121.9
‡Clrnc Del 127.35
ATIS: 120.95

Radar Services:
App Con 119.2 (180–359°) 126.1 (360–179°) 126.65
Dep Con 125.5 120.45 125.05
Stage II Arr 126.1 from NE, E, SE. Arr 119.2 from SW, W, NW Dep 125.5
ILS 111.3 I–DLX Rwy 19R
110.1 I–SGC Rwy 19L
108.7 I–IAD Rwy 1R BC unusable **LOM** 346/IA

§ WASHINGTON NATIONAL (DCA) ***IFR*** 3S
FSS: WASHINGTON on Fld
15 H69/18–36(4) (S–110, D–200, DT–360) BL5,6,7A,8,10,11,14,15 S5 F12,18,22,30 Ox1,2 U2 **VASI:** Rwys 3, 15, 18, 21, 33 **AVASI:** Rwy 34 **REIL:** Rwy 3–21, 15–33, 18 **RVR:** Rwy 36 **RVV:** Rwy 18

Remarks: High-Density Traffic Airport—prior reservation required, contact FSS for instructions. Coded transponder required for VFR and IFR. VFR reservation information avbl on ATIS. Turbulence apch ends rwy 21, 33 and 36. Rgt tfc rwys 15, 18, 21. Rwy 15 avbl on req all jet tkofs, no runup in position prior to tkof, rolling tkofs only. Special Air Traffic Rules—Part 93. Subpart C in effect. Twr unable to observe airborne acft during hrs of darkness at lower alts SW of arpt due to railroad floodlights. REIL rwy 33 will be on at all times when arpt is in a north operation. Rwy 18–36 grooved only first 3500' rwy 36 and 75' each side of cntrln. Fee. VASI rwy 3 TCH 68', RRP 1250'; VASI rwy 33 TCH 53', RRP 1000'; AVASI rwy 34 TCH 185', RRP 175'; VASI rwy 18 TCH 50', RRP 950'. See Part 4 for noise abatement procedures. VASI rwy 15 TCH 57', RRP 1100'. VASI rwy 21 TCH 53', RRP 1000'.

Washington Tower 119.1 120.75 **Gnd Con** 121.7
‡ Clrnc Del 128.25
ATIS: 132.65

Radar Services:
App Con 124.2 (East) 119.85 (West)
Dep Con 118.1 (West) 126.55 (East)
TCA Group 1: See NOS TCA chart
ILS 109.9 I–DCA Rwy 36 BC unusable **LOM:** 332/DC
ILS–LDA 108.5 I–ASO Rwy 18
Washington VOR/DME 111.0/DCA on fld
NDB MH–SAB 001° 4.6NM to fld. (See Oxon, Md.)
VHF/DF Ctc twr.

Remarks: LOM is Oxon, Md. NDB. Rwy 36 LOC unusable beyond 10NM beyond 20° East side of crs.

FIGURE 62. Airport/facility directory.

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NOTICES TO AIRMEN

This part is issued every 14 days. It contains appropriate notices from the daily NOTAM Summary, and other items considered essential to flight safety.

This section contains Notices to Airmen that are expected to remain in effect for at least seven days. Temporary notices without published duration dates are normally carried twice unless resubmitted.

NOTE: Data preceded by a checkmark (✓) are considered permanent and will be published one time only in this section. Data should be noted on charts and records.

NOTE: Notices are arranged in alphabetical order by State (and within the State by City or locality).

NEW OR REVISED DATA: New or revised data are indicated by underlining the first line of the affected item. The new information is not necessarily limited to the underlined portion, which is used only to attract attention to the new insert.

ALABAMA

✓ALEXANDER CITY, THOMAS C RUSSELL FLD ARPT: Rwy 9–27 permly clsd.

✓DOTHAN ARPT: MALSR rwy 31 cmsnd.

TUSCALOOSA: FSS remains operational, telephone number—(205) 758–3628.

TUSKEGEE—MOTON FIELD ARPT: Const in progress. Arpt clsd til aprxly Dec 1973. (3–73)

ALASKA

SPECIAL NOTICE: Pilots flying aircraft equipped with SCR–718 altimeters will assure that the altimeter is turned off within 200 NM of Clear, Alaska and Thule, Greenland.

For complete information on Alaska consult the Alaska Supplement.

ARIZONA

BISBEE MUNI ARPT: Rwy lgts 2–20 inop. (8–73)

✓FLAGSTAFF RDO: LRCO freq changed to 123.65R.

GRAND CANYON NATIONAL PARK ARPT: ATCT deactivated until aprxly 1 June 74.

GRAND CANYON NATIONAL PARK: All pilots are requested to avoid flying below the canyon rim and to maintain a distance 1500′ above and horizontally from all scenic overlooks, parks, trails and Grand Canyon Village.

✓PHOENIX, TURF ARPT: 8 ft fence parallel and 45 ft N of centerline extending from threshold rwy 4 to 1300 ft down rwy.

✓PIERCE FERRY ARPT: Arpt abandoned.

PRESCOTT MUNI ARPT: Obstrn 30′ AGL lctd ¼ NM SSW of TDZ rwy 3 unlgtd. First 1450′ rwy 11 clsd.

ARKANSAS

EL DORADO, GOODWIN FLD: Threshold rwy 22 displaced 413′. (6–73)

FORDYCE MUNI ARPT: Rwy 04 thr dspicd 100′. (8–73)

HELENA/WEST HELENA - THOMPSON - ROBBINS ARPT: Rwy 17–35 clsd UFN. (9–73)

✓MARIANNA ARPT: Arpt abandoned.

CALIFORNIA

SPECIAL NOTICE: Do not mistake dirt strip on large island, Lake Berryessa, lctd lat 38–34 long 122–13 for airport. Strip is unauthorized and unsafe.

ANO NUEVO ISLAND: Avoid low flying in the vicinity and over island. Biological research of wild life in progress.

✓BIG BEAR CITY ARPT: Rwy 8–26 ident changed to 7–25. Rwy length 5850 ft.

BIG BEAR CITY ARPT: Arpt bcn lgt inop. (12–73)

BISHOP RDO: VOR ident "BIH" OTS. (11–73)

BLYTHE ARPT: Intensive airline jet acft training in progress 24 hrs daily. Inbound acft report 20 miles out on 123.6 and guard 123.6 for arpt advisory service, UFN. Use other freqs for other purposes. Unicom is not for arpt advisory use.

✓BRIDGEPORT, BRYANT FLD ARPT: Rwy lgts operg phone request, call 714–932–8551.

CHINO ARPT: Constr on arpt til aprxly Jan 1974.

✓CRESCENT CITY, JACK McNAMARA FIELD: MALSR rwy 11 cmsnd.

✓DINUBA, ALTA ARPT: Rwy lgts operg phone request, call 209–528–3024.

FRESNO AIR TERMINAL: Unlgtd 250′ AGL crane lctd 5 NW of arpt til aprx Jan 1975.

MARYSVILLE-YUBA CO. ARPT: ATCT freq change delayed. Lcl ctl freq 120.7 will be retained til aprxly Feb 74 at which time 119.3 will be cmsnd. (11–73)

LOS ANGELES INTL ARPT: ILS/OM "I–LAX" serving rwy 25L shutdown til aprxly Dec 20. (8–73)

MODESTO CITY-COUNTY ARPT: Rwy 10R–28L clsd to acft over 12,500 lbs GWT. Turbojets requested to discontinue operations 2400–0500 lcl and park N side of arpt. (12–73)

✓PALM SPRINGS MUNI ARPT: VASI rwy 30 not to be used beyond 3 NM or Cathedral City due to high terrain. VASI opers 0600–2300 lcl. VASI upper TCH 92′, lower TCH 53′, upper RRP 1600′, lower

FIGURE 63. Airman's Information Manual—Part 3A.

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FIGURE 64. Index of olive branch routes.

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FIGURE 64. Matrix of olive branch routes.—Continued

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CHICAGO TERMINAL CONTROL AREA
(GROUP I)

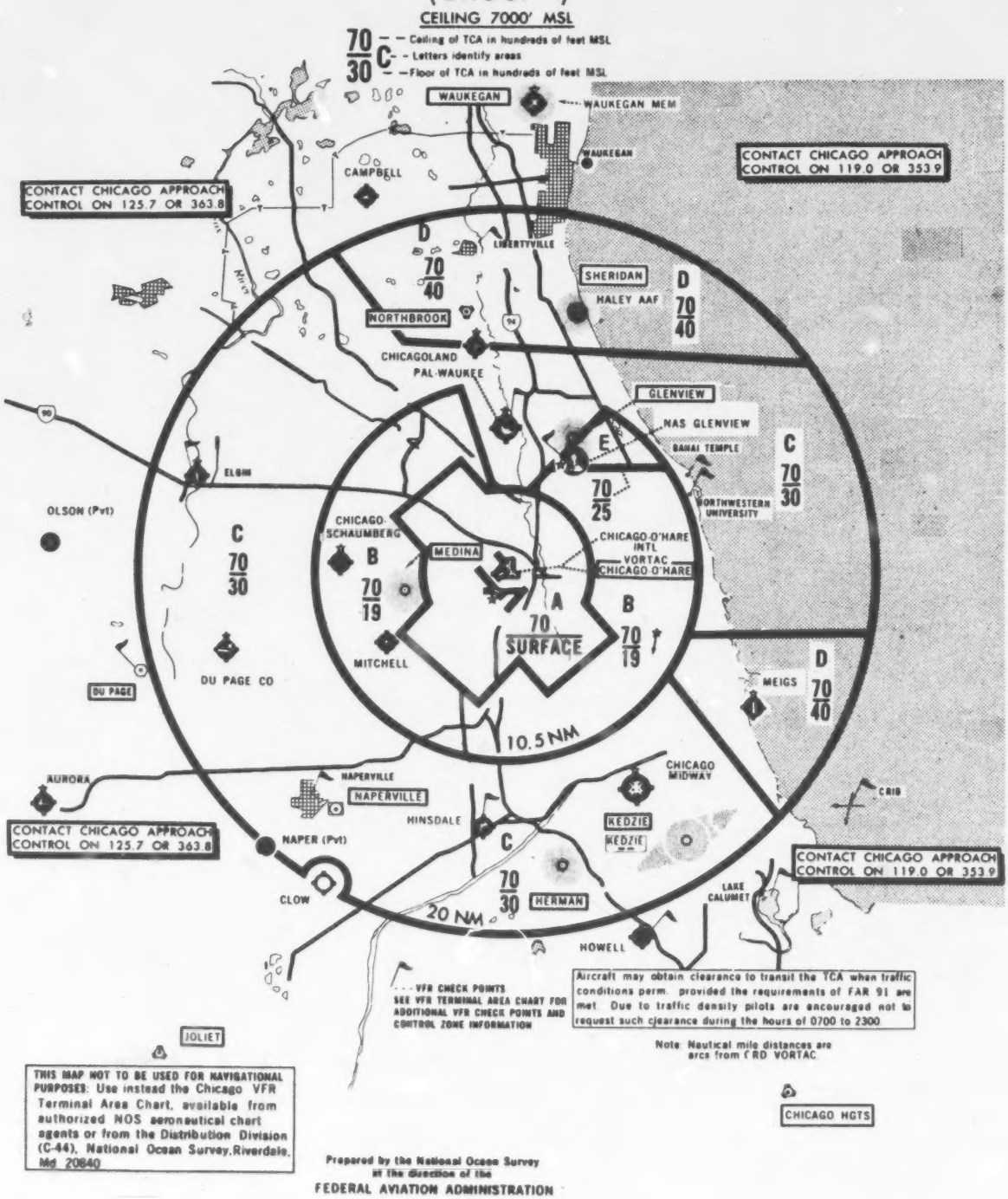

FIGURE 66. Terminal control area.

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WICHITA FALLS TEXAS TERMINAL AREA-GRAPHIC NOTICE

THERE IS A HIGH VOLUME OF STUDENT JET OPERATIONS IN THE TERMINAL AREA. THE DARK ARROWS INDICATE JET IFR ARRIVAL AND DEPARTURE ROUTES THAT ARE MOST COMMONLY USED. RECOMMENDED VFR ARRIVAL AND DEPARTURE ROUTINGS ARE SHOWN BY THE LIGHT ARROWS. RECOMMEND VFR TRAFFIC STAY AT OR BELOW 2300 MSL IN VICINITY OF SHADED AREAS. CONTACT SHEPPARD APPROACH CONTROL ON 125.5 MHz 25 NM OUT FOR RADAR ADVISORY SERVICE.

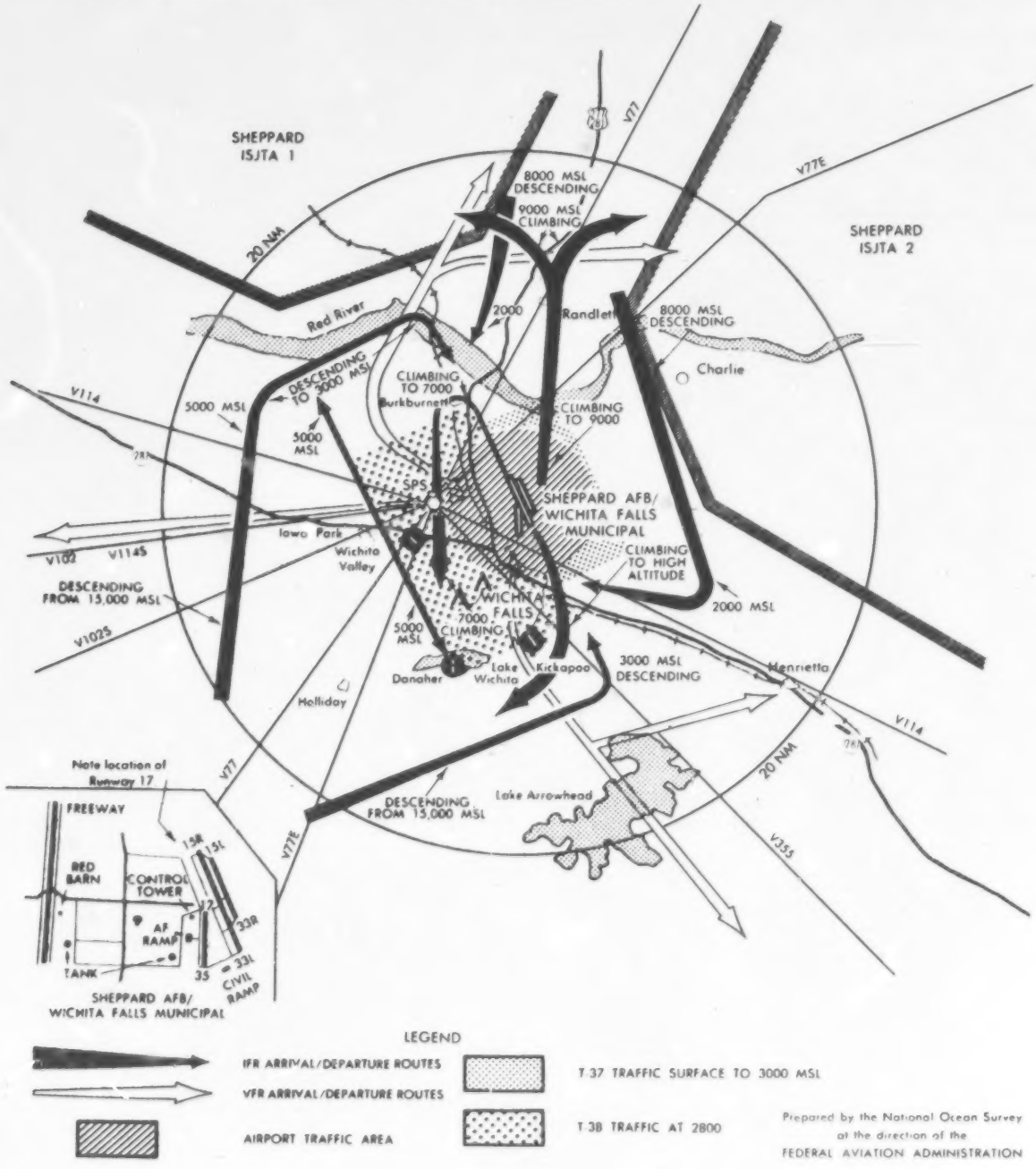

FIGURE 67. Terminal area graphic notice.

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LITTLE ROCK, ARKANSAS, ADAMS FIELD
FIELD ELEV. 257' MSL

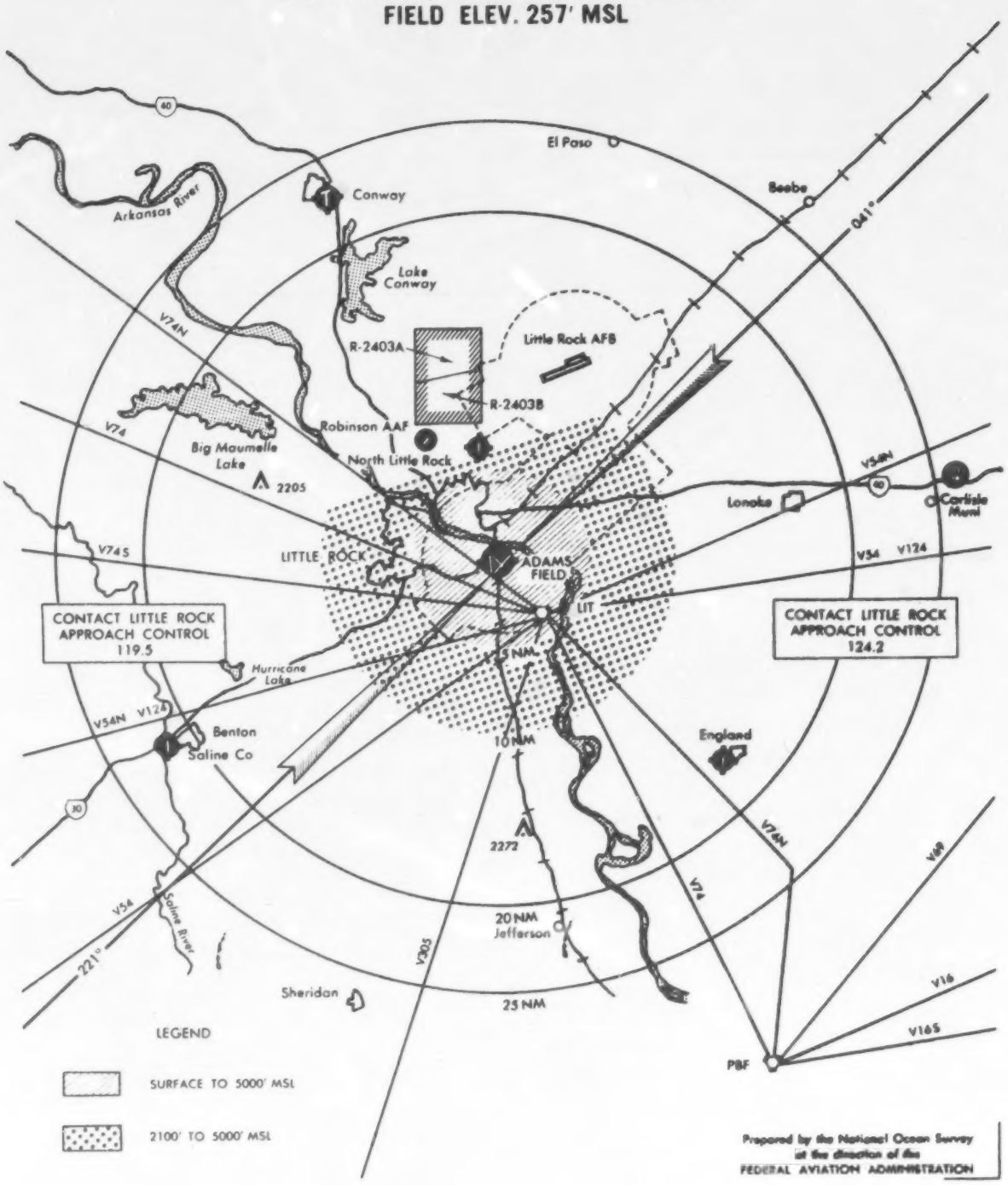

FIGURE 68. Terminal radar service area.

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APPENDIX J—Exam-O-Grams

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

VFR PILOT EXAM-O-GRAMS

1/74

Exam-O-Grams are brief and timely explanations of important aeronautical knowledge items. These items include concepts and procedures that are critical to aviation safety, common misconceptions among airman applicants, and areas which cause general difficulty in written tests.

Exam-O-Grams are developed on a continuing basis, only as needs arise, and not on a regularly scheduled basis. They are distributed free (one copy per request) to airman applicants, pilots, ground and flight instructors, educational institutions, airman training centers, flying clubs, and other interested groups and individuals. Exam-O-Grams may be reproduced without further permission from FAA.

VFR EXAM-O-GRAMS

No.	Title and Revision Date
2	VFR Cruising Altitudes - 10/71
4	Preflight Planning for a VFR Cross-Country Flight (Series 1) - 1/74
5	Preflight Planning for a VFR Cross-Country Flight (Series 2) - 10/71
6	Preflight Planning for a VFR Cross-Country Flight (Series 3) - 3/71
15	How to Use VOR (Series 1) - 8/64
16	How to Use VOR (Series 2) - 8/64
17	Common Misconceptions (Series 1) - 10/71
18	Lost Procedures -- Pilotage - 9/64
19	Emergency or Lost Procedures (Radio) - 1/74
20	Ceiling and Visibility - 1/74
21	Flying into Unfavorable Weather - 7/69
22	Potential Midair Collisions - 1/74
23	Interpreting Sectional Charts (Ser. 1) - 11/70
26	Common Misconceptions (Series 2) - 1/74
27	The Effect of Wind on an Airplane - 1/74
28	Factors Affecting Stall Speed - 9/65
29	Potential Midair Collisions (Series 2) - 1/74
33	Use of Performance Charts - 4/66
34	How to Obtain Proper Weather Briefing - 1/74
35	UNICOM Frequencies and Uses - 11/67
36	Commonly Misunderstood Areas of Aeronautical Knowledge (Series 1) - 1/72
37	Commonly Misunderstood Areas of Aeronautical Knowledge (Series 2) - 1/72
38	Mixture Control -- Fuel/Air Ratio - 11/66
39	Simple ADF for VFR Navigation - 8/67
40	Visual Approach Slope Indicator (VASI) - 1/74
41	Controlled Airspace (Series 1) - 10/71
42	Controlled Airspace (Series 2) - 10/71
43	ATIS (Automatic Terminal Information Service) - 1/74
44	How High the Clouds? - 1/74
45	Airspeeds and Airspeed Indicator Markings (Series 2) - 1/69
46	Aviation Weather Reports -- Remarks - 1/74
47	Ground Effect - 1/74
48	Midair Collisions (Series 3) - 1/74
49	Use of Oxygen in General Aviation Aircraft - 1/71
50	Interpreting Sectional Charts (Series 2) - 1/74
51	Interpreting Sectional Charts (Series 3) - 4/71
52.	Sky Cover and Ceiling - 4/72

In this set of Exam-O-Grams the following issues have been deleted: Nos. 1, 3, 7, 8, 9, 10, 11, 12, 13, 14, 24, 25, 30, 31, and 32. They have been discontinued since the subject areas which they cover are now adequately treated in one or more of the following FAA publications:

Pilot's Handbook of Aero. Knowledge, AC 61-23A
Aviation Weather - AC 00-6
Airman's Information Manual (annual subscription)
Other pertinent FAA Advisory Circulars

Order from:
Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

The Advisory Circular Checklist and certain free Advisory Circulars may be obtained from:

U.S. Department of Transportation
Distribution Unit, TAD-443.1
Washington, D. C. 20590

FIGURE 69. List of VFR Exam-O-Grams.

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration

IFR PILOT EXAM-O-GRAMS

4/73

Exam-O-Grams are brief and timely explanations of important aeronautical knowledge items. These items include concepts and procedures that are critical to aviation safety, common misconceptions among airman applicants, and areas which cause general difficulty in written tests.

Exam-O-Grams are developed on a continuing basis, only as needs arise, and not on a regularly scheduled basis. They are distributed free (one copy per request) to airman applicants, pilots, ground and flight instructors, educational institutions, airman training centers, flying clubs, and other interested groups and individuals. Exam-O-Grams may be reproduced in their entirety or in part, without further permission from the Federal Aviation Administration.

IFR EXAM-O-GRAMS

No.	Title and Revision Date
2	Use and Abuse of Radar - 2/71
5	Aviation Weather Reports and Forecasts - 2/71
6	VFR Operations on an Instrument Flight Plan - 9/69
7	CDI Interpretation - 9/69
8	Minimum IFR Altitudes - 2/71
10	Altimetry - 12/67
11	Communications Procedures for Pilots on Instrument Flight Plans - 2/71
14	VOR Quiz - 8/65
15	The Weather Depiction Chart is for You - 2/71
16	The Low Level Prognostic Chart - 4/73
17	The Radar Summary Chart - 2/71
18	Rate of Turn - 1/67
19	Telephone Weather Briefing - 6/71
21	IFR Weight and Balance Computations - 9/67
22	VOR Receiver Accuracy Check - 9-68
23	Fundamental ADF Procedures - 1/71
24	The Attitude Indicator - 5/70
25	The ATC Transponder - 2/71
26	Runway Marking - 10/71
27	Airport Surveillance Radar (ASR) Approaches - 4/73
28	Category II Taxiway Holding Lines - 7/69
29	When an Alternate Airport is Not Required - 3/70
30	VORTAC Area Navigation - 5/70
31	Is Your Instrument Flight Really Legal? - 10/70
32	Aircraft Performance Charts - 3/71
33	Runway and Displaced Threshold Lighting - 1/72
34	IFR Departure Clearances - 9/71
35	Clearance Delivery Procedures - 1/72
36	Lost Communications Procedures - Altitude Requirements - 1/72
37	Lost Communications Procedures - Route Requirements - 9/72
38	Lost Communications Procedures - Approach Requirements - 3/73
39	Enroute Chart Information - 4/73

Exam-O-Grams Nos. 1, 3, 4, 9, 12, 13, and 20 have been deleted since the subject areas are adequately treated in other FAA publications. The material in Exam-O-Gram No. 1 is covered in AC 90-1A. This Advisory Circular, and certain other free Advisory Circulars, and the Advisory Circular Checklist may be obtained from: U. S. Department of Transportation
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FIGURE 70. List of IFR Exam-O-Grams.

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